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Bulletin material; news of non-joint meets; orders for the AWA Review or OTB back issues: Ludwell Sibley (Editor), 44 E. Main St., Flemington, NJ 08822-1224, (908) 782-4894. **(Exception: column material should go to column editors.)**

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AWA NETS (EST)

PHONE:

Sun. 7247 kHz SSB, noon (NCS: N4FS)
3837 kHz, QRP AM, 4 PM, Nov. thru April (NCSs: W2ICE & AA2CU)
Tues. 14274 kHz SSB, 2:30 PM (NCSs: KC3YE & W0FXY)
3837 kHz SSB, 8 PM (NCS N4FS)
Mon.-Wed.-Fri. 3867 kHz, 9:30 AM (NCSs: W2ICE & W2SHN)

CW:

Daily, 4 PM, 7050 kHz (NCS varies)
First Wed. of each month, 8 PM, 7050

2-M REPEATER (Rochester area):
Mon., 7:30 PM (NCS: W2ICE)
Receive 146.820 MHz; transmit 146.220

FROM THE SKUNKWORKS

Ludwell Sibley, KB2EVN, Editor

THIS ISSUE. We have photo coverage of the Rochester Conference - the November issue had just a "flash report" due to the pressures of time and page space. In addition, we have two articles on items that formed "knockout" displays in the Equipment Contest: Stephen Brown's coverage of the majestic Aeriola/Radiola Grand receivers, and Bill Stokes' story on his scratch-built wireless receiver. We "expect" stunning displays from veterans like Robert Lozier or the Jury Brothers, but Brown and Stokes were first-timers.

The 1994 Conference is coming up. Because of the special themes in the Equipment Contest, Ralph Williams has provided an early rundown on this year's contest categories. Remember: only 234 construction days remain 'til the conference . . .

SCOTT SOCIETY PROSPERS. The E. H. Scott Historical Society has been in operation almost two years now, and seems to be thriving. The group's quarterly *Scott News* has published numerous features: a detailed biography of E. H. S., an interview-based profile of Marvin Hobbs (Scott's chief designer during the Golden '30s), a story on the President's-airplane AR-1 receiver (a sort of "flying RBO"), a comparison of Scott sets with their McMurdo Silver competitors, a bibliography of 66 *Radio News* articles on Scott, Silver, and Lincoln sets, and similar features. Some "hot-stuff" articles and additional member services are known to be in the works for 1994. Back issues of the *Scott News* are available. The society offers members an oldie-movie video on construction of the All-Wave 15, affordable copies of instruction and repair manuals, and want ads dedicated to Scott sets and parts. Organizers John Meredith and Jim Clark have done an effective job with this focused-interest group.

Membership is $20, January-to-January, from EHSHS, PO Box 1070, Niceville, FL 32588-1070.

HERE . . . A new edition of "Hints for AWA Authors": helpful stuff for those with article ideas for the *OTB* or Review, obtainable by sending an SASE to the editor in Flemington.

. . . AND GONE. The R1155 receiver data offered last August; the copies are exhausted . . . Sorry.

THE COVER. QRV, or "Are you ready?" to radiomen, meant a lot as regards this illustration marking the resumption of amateur radio after WW I.

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AWA NEWS

CALENDAR

Feb. 5	CHRS Swapmeet, Redwood City
Feb. 6-7	1994 Classic Radio Exchange
Feb. 9-10, 12-13	AWA Old-Time CW Contest
Feb. 26	NJARC Swapmeet, Hightstown
March 5	Video pgm., AWA Annex, Bloomfield
Mar. 25-26	AWA SE Meet, Charlotte
March 26 (tent.)	AWA Florida Meet, Bradenton
April 2	Tube program, AWA Annex
May 7	AWA Spring Meet, Bloomfield, NY
May 7	CHRS Swapmeet, Redwood City
May 13-14	IHRS-AWA Spring Meet, Kokomo
May 14	AWA-NJARC Tranquility meet
May 20-21	NARC Radio Daze, Bloomington, MN
May 21-22	Rochester Hamfest (AWA exhibit)
June 17-18	MAARC/AWA RADIOACTIVITY, New Carrollton, MD
Sept. 21-24	Annual Conference, Rochester
Oct. 14-16	VRPS/AWA Convention, Dallas
Oct. 22	HARPS Show, Middletown, NY
November 6	AWA annual bus. meeting, Rochester

OTB POLICY ON PROMOTING EVENTS

You get the info to us, and we'll announce it.

For joint club-AWA meetings (with slide shows, etc.), please send the information in through Richard Ransley, the coordinator. For stand-alone club events, just get it in to the *OTB* editor - addresses on the inside front cover. Elegant format is not necessary; timeliness is. We don't want a nice printed brochure, too late to be used; we need the simple facts up-front. This section of the *OTB* is the last to close, about 4½ weeks before the nominal date of the next issue.

After-action reports are welcome, for events that have been announced in the *OTB*. Being *news*, they should be sent in while still fresh.

RECURRING MEETINGS

California Historical Radio Society. Quarterly swapmeets in the Ampex Corporation parking lot in Redwood City on Feb. 5, May 7, August 6, and Nov. 5. Gates open at 8:00 AM. Regional events: General address is CHRS, PO Box 31659, San Francisco, CA 94131; 24-hour voicemail info: (415) 978-9100). (Info from Mike Adams)

Delaware Valley Historic Radio Club. This club in southeastern Pennsylvania meets the second Tuesday of each month, at the North Penn Amusement Building, 105 Main St. (alias Rte. 113), Souderton. The meeting includes an equipment auction. Membership is $5/yr. For details: PO Box 624, Lansdale, PA 19446, or Jay Daveler, (215) 368-2520.

Hudson Valley Antique Radio & Phono Society. Meetings the third Thursday of the month at 7 PM. For meeting, swapmeet, and membership info, write HARPS, PO Box 207, Campbell Hall, NY 10916 or call John or Linda Gramm at (914) 427-2602.

Mid-Atlantic Antique Radio Club. Meets monthly at the New Hope Seventh Day Adventist Church in Burtonsville, MD, Saturday, Feb. 12 at 6:30 PM, then Sundays at 2:00 (March 20, April 17, May 15). Contacts: Lloyd Kendall, (703) 471-6143, or Joe Koester, (301) 725-4229.

New Jersey Antique Radio Club. Meets the second Friday of each month at 7:30 PM. Holds three swapmeets a year. Contact: send SASE to Tony Flanagan, 92 Joysan Terrace, Freehold NJ 07728, (908) 462-6638.

Oklahoma Vintage Radio Collectors. Meets the second Saturday of each month, at Spencer's Barbecue Restaurant, NW 63rd and May Ave. in Oklahoma City. Dinner and socializing starts at 6 PM, meeting at 7. Membership is $12 per year and includes the monthly *Broadcast News*. More info: SASE to OKVRC, PO Box 72-1197, Okla. City 73172-1197; or call (405) 722-0595 or (405) 755-4139 eves.

Ottawa Vintage Radio Club. This new club, about a year old, meets monthly - Feb. 9, March 9 - 7 PM at the Conference Room, Ottawa Citizen, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601 - 810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. (Membership is $10 Can. per year, with a high-quality newsletter and club tube-supply program.)

Southern California Antique Radio Society. Quarterly flea market and lunch at the Velvet Turtle on Sepulveda Blvd. in Torrance, on the third Saturday of each third month. Information: Floyd Paul, (818) 242-8961.

NEW JERSEY MEET

Saturday, February 26

The New Jersey Antique Radio Club plans an indoor swapmeet at the Hightstown Country Club, 8 AM - 3 PM. Site (the same as for 1993 meets) is near Exit 8 of the NJ Turnpike and just off Route 33. From the Turnpike, go east on Rte. 33 about 200 yards (past "Mom's Peppermill" restaurant); continue ¼ mile to the first jughandle, and go west. At the first traffic light, bear right onto Monmouth St., then 300 yards to the Country Club on the left.

Entrance fee for buyers, $2. Sellers: members, $12 per table; others, $15. Hot beverages and snacks available. Mention NJARC for reduced room rates at the Ramada Inn across the street [(609) 448-7000] or the Town House Motel nearby [(609) 448-2400, or 800-922-0622 out of state]. Contact: Jim or Ruth Whartenby, (908) 271-7701.

NORTH CAROLINA MEET

Friday-Saturday, March 25-26

The 18th AWA Spring Southeastern Meet will be held in Charlotte. This event, held in recent years in Monroe, NC, has outgrown the current facility and is being moved to a larger and handier site with a large covered area for tailgating in case of rain.

The new location is the Best Western (Merchandise Mart), 3024 East Independence Blvd. The number for room reservations is 1-800-424-2756. For complete details and information, contact either Stephen C. Brown, KD4YFY, 3808 Champaign St., Charlotte, NC 28210, (704) 847-1301 or Ron Lawrence, KC4YOY, PO Box 220094, Charlotte, NC 28222, (704) 289-1166. - SCB

FLORIDA MEET - BRADENTON

Saturday, March 26 (tentative)

Meet, flea market starting at 8:00 AM, at Stewart Elementary School, 7905 15th Ave., N. W., Bradenton. For more details, send an SASE or phone Norm Smith, 7203 17th Ave., N. W., Bradenton, FL 34209, (813) 792-0003.

INDIANA MEET

Friday-Saturday, May 13-14

IHRS will present its Spring Meet at the Ramada Inn in Kokomo, same site as in past years. More details in the May *OTB*.

NEW JERSEY MEET

Saturday, May 14

AWA and the New Jersey Antique Radio Club will jointly present this year's Tranquility meet, off I-80. Event is to be expanded; an auction is planned. Full details in the May *OTB*. Contact: Marvin Beeferman, (609) 693-9430.

MINNESOTA MEET

Fri.-Sat., May 20-21

The Northland Antique Radio Club will hold its 1994 "Radio Daze" at the Seville Hotel in Bloomington, MN. Guest speaker will be Dr. Riccardo Kron, best known for the *Antique Radio News*, presenting the life and times of Guglielmo Marconi. Auction Friday night; flea market and equipment contests Saturday. Admission to the Pavek Museum will be free to all attending. Details in May.

MARYLAND MEET

Friday-Saturday, June 17-18

The Mid-Atlantic Antique Radio Club is planning RADIOACTIVITY, a two-day event, at the Sheraton in New Carrollton, MD (just east of Washington, DC). The program so far includes an all-day refinishing seminar, two excellent talks, equipment contest, banquet, and flea market. Contact: Joe Koester, 249 Spring Gap South, Laurel, MS 20724, (301) 725-4229. More details as they become available - but looks like a "hot" event.

AWA ANNEX MEETINGS

A series of Saturday afternoon meetings will be held in the AWA Museum annex (American Legion grounds off U. S. 20, Bloomfield, NY) at 2 PM beginning March 5. All AWA members are invited. Coffee and doughnuts will be served. March 5: videos: "The Charles Herrold Story" (by Mike Adams) and "Tour of Sweden's Alexanderson Alternator Station" (by Bengt Svensson). April 2: Collecting and identifying common and rare tubes (Lauren Peckham and Bruce Kelley). Other dates to be announced.

MEET REPORT: DALLAS VRPS-AWA CONVENTION '93

The VRPS-AWA Convention '93, held in October in Dallas, TX, was again a highly successful radio-wireless event, enjoyed by the many Vintage Radio and Phonograph Society and AWA members who attended the three-day event. Total attendance was 380, with 35 new members joining the Society on-site. There were two large auctions, plus two silent auctions handling a total of 682 items. The Old Equipment Contest displayed some very interesting sets, from WW I era wireless to unusual transistor models. The indoor (weatherproof!) flea market brought out a great assortment of equipment and buyers.

The 1994 Convention will mark the 20th anniversary of VRPS, and special events are already being planned. Same location, Dallas, October 14-16. Details in a later *OTB*. - Chevie Crandell

AWA BUSINESS AND BOARD MEETINGS - NOVEMBER

The annual AWA business and board meetings took place in Rochester on November 6.

Elections. In the business meeting, elections took place to fill vacancies on the Board of Directors. Lauren Peckham, as chairman of the nominating committee, proposed Dexter Deeley, Chris Fandt, Joyce Peckham, Roland St. Louis, Jack Wenrich, and Morgan Wesson, whose terms were expiring, as candidates. Jim Frederick, K2GBR, was nominated as a new member. All candidates were voted in for a three-year period. AWA's existing officers (Bruce Roloson, Richard Ransley, William Fizette, Joyce Peckham, Dexter Deeley) were all nearing the ends of their terms. They accepted nomination and were reelected in the board meeting for 1993-95.

Finances. Dexter Deeley described the financial status of the Association and Museum as satisfactory, with modest improvements over past years due in part to increased donations for Museum support. The Board approved his budget for the coming year and, in view of the low yields currently available

(Continued on p. 14)

A COMPARISON-CONTRAST OF THE AERIOLA GRAND AND RADIOLA GRAND

Stephen C. Brown
3808 Champaign St., Charlotte, NC 28210

The Aeriola Grand and Radiola Grand were RCA's first attempts at a radio and speaker in one cabinet. They were released quite early in the Radio Corporation's history: the Aeriola Grand appeared in March, 1922 and was superseded by the Radiola Grand in December [1].

The Aeriola Grand was created to provide a radio novice or the average family member, who had little knowledge of the "technicalities of the art" of radio, with a broadcast receiver that was simple to operate [2]. The Aeriola could receive wavelengths from 150 to 550 meters (545-2000 kHz) and it was recommended that the distance from the broadcast station not exceed 50 miles [3].

Apparently it worked well in certain situations; not all Aeriola Grands were replaced with Radiola Grands because at least one surviving Aeriola Grand has been found, in February 1993, that had not been returned to RCA. The Aeriola Grand was never actually recalled by RCA; in fact, dealers were encouraged to continue selling them to customers who lived in areas where the dealer was sure that the receiver would operate satisfactorily. After all, there were a number of Aeriola Grand users who were quite satisfied with their sets [4].

Fig. 1. Aeriola Grand, in standard cabinet, displayed in the Henry Ford Musum, Dearborn, Michigan. Note the extra tube socket at the rear of the radio panel and the lack of a speaker jack on the left side of the cabinet.

However, RCA must have thought either that there were a lot of customer complaints or that their radio did not perform as well as others on the market, because work was under way on the improved Radiola Grand by the summer of 1922, prior to August 21 [5]. The plan was to have the latter in production by October [6]. Dealers were authorized to replace an Aeriola Grand with a Radiola Grand on an exchange basis at no charge to the customer.

Along their path of evolution, both the Aeriola Grand and the Radiola Grand shared the same cabinets and some minor pieces of hardware and even the same model identification, the Model RG. Naturally, there were major differences in tubes and circuitry, and some minor changes as well.

Fig. 2. Radiola Grand in standard cabinet with accessory battery stand. The battery stand was first available with the Aeriola Grand.

CABINETS

There are basically two cabinet styles in the Aeriola/Radiola Grand series. The first (Fig. 1) is a rather plain, boxy yet highly finished, mahogany cabinet. It has a grille, cut out in a geometric pattern, covering the opening of the wooden horn speaker in the bottom of the cabinet. The top is hinged at the rear and, when lifted, exposes the radio panel. This cabinet style seems to be the oldest and appears in the earliest RCA advertising, as pictured on page 8 of Douglas' Radio Manufacturers of the 1920s. This cabinet was carried over to the Radiola Grand (Fig. 2) and is the most prevalent one found by collectors.

The second cabinet design is a much more ornate style with a beveled lid, over-hanging radio panel, and a scalloped skirt along the bottom edge of the cabinet. This "scalloped" work forms the feet of the cabinet at the corners. The cabinet strongly resembles a table-model Victor "Victrola" (Fig. 3). The grille cutout, in the shape of a lyre, is much more ornate than that of the standard cabinet. A picture of this cabinet also appears on page 9 of Douglas' book. This cabinet was carried over to the Radiola Grand (Fig. 4).

Each Grand cabinet has a nameplate in the form of a decal centered on the inside of the lid. There is some variation in the design of these decals. The first (Fig. 7) looks similar to the federal shields used to identify interstate and U. S. highways. The name "Aeriola Grand" is on two lines centered in the emblem. The Westinghouse Electric & Mfg. Company logo of a "W" in an orange circle is at the apex of the shield.

Fig. 3. Aeriola Grand in the ornate "deluxe" cabinet.

The second style of identification is a simple, bright yellow decal, 1.6" by 3.5," reading "Aeriola Grand" on a single line. The Aeriola Grand in the Henry Ford Museum in Dearborn, Michigan (Fig. 1) has this decal. The Radiola Grand in Figure 2 has been converted from an Aeriola Grand and also has this "Aeriola" style of decal showing through from beneath its Radiola decal.

The last type of decal (Fig. 8) is the one found on all Radiola Grands. It is a gold, 2.5" x 4.5" emblem that includes not only the licensing information but also, for the first time, the RCA logo. This was at a time when the Radio Corporation was starting to place less emphasis on its manufacturing facilities and more on RCA itself.

TUBES

The most striking and obvious difference upon lifting the lids of these two radios is the number of tubes protruding from the radio panel. The Aeriola Grand has two rows of four tubes, while the Radiola Grand has only four in all. Tubes used in both the Aeriola Grand and Radiola Grand were made by Westinghouse and upon first glance look to be the same, but are quite different (Fig. 9).

The Aeriola Grand has three WR-21A "Aeriotron" amplifier tubes in the front row, counting from left to right, while the fourth is for a WR-21D "Aeriotron" detector. This tube has a small coating of green lacquer on its tip to distinguish it from the amplifier tube [7]. The WR-21s have four pins, all the same diameter, in an offset

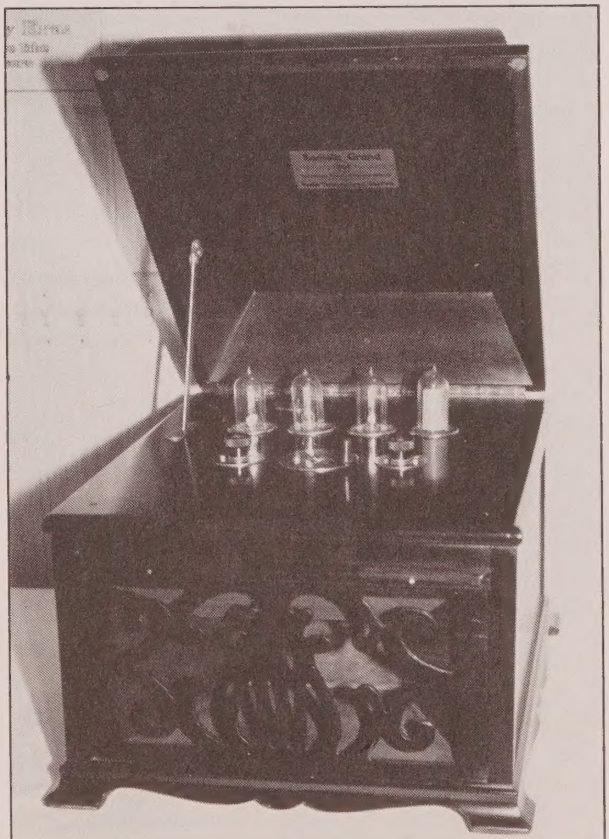


Fig. 4. Radiola Grand in the "deluxe" cabinet. This particular radio was formerly an Aeriola Grand. A tell-tale sign of this is a screw hole, now filled, that once held the bracket for the dummy plug.

pattern similar to the European four-pin arrangement. These tubes have a current rating of 0.8 ampere at 4 volts. Power to the filaments is supplied by a six-volt storage battery which could be recharged with the optional "Rectigon" battery charger, model 6HR-9 [8]. The four tubes in the back row are all WB-800 ballast tubes. These have only a filament and are in series with the filament circuits of the three amplifier tubes so as to eliminate the need for rheostats to regulate the current to the filaments of the WR-21As.

The Radiola Grand uses four tubes. The first three, left to right, are amplifiers and the fourth is the detector. These tubes are all "Radiotron" WD-11s. At first glance these tubes are identical in size and shape to the WR-21, however, the plate pin on the WD-11 is larger in diameter than on the WR-21 so the tubes cannot be interchanged. The WD-11 has a filament rating of 0.25 ampere at 1.1 volts with power supplied by a No. 6 dry cell.

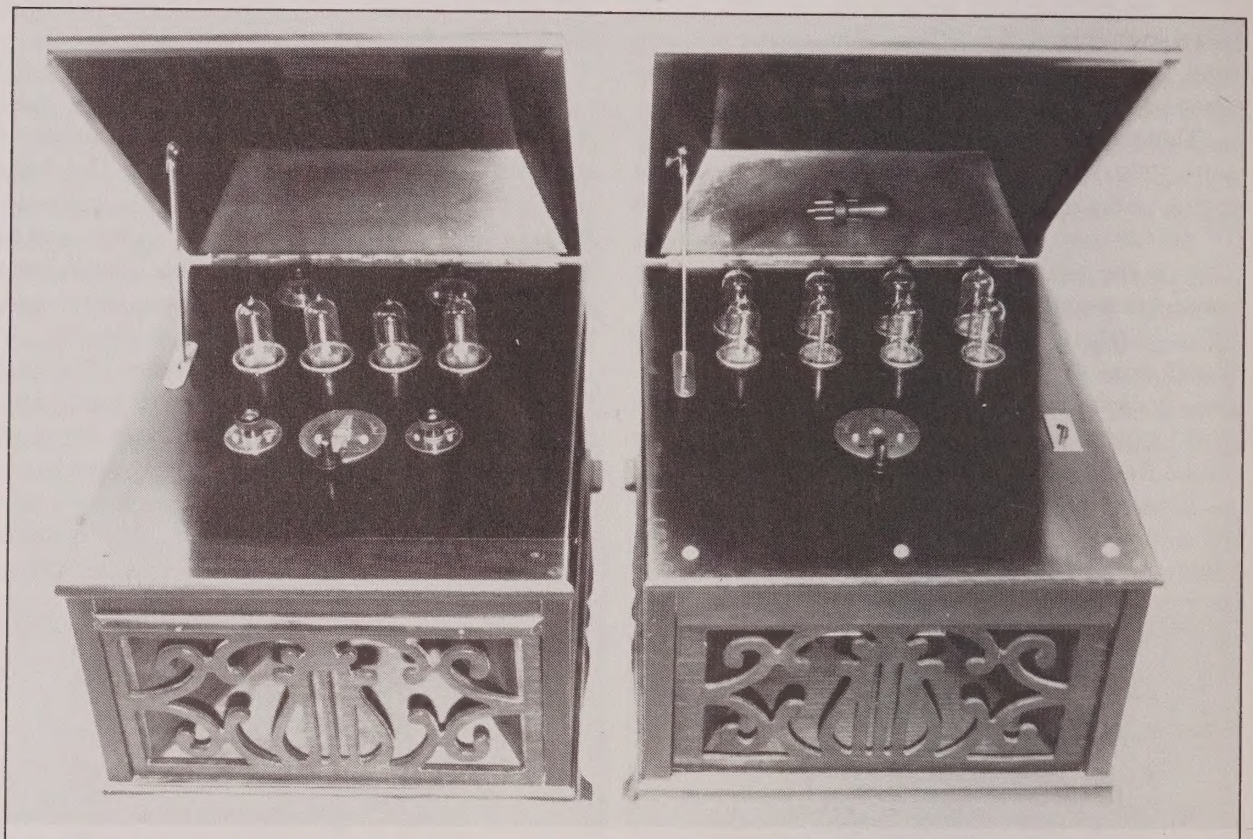


Fig. 5. Comparison of Radiola Grand on the left and Aeriola Grand on the right. The push-button switch to the right of the Aeriola Grand's tuning dial is to turn the instrument on and off.

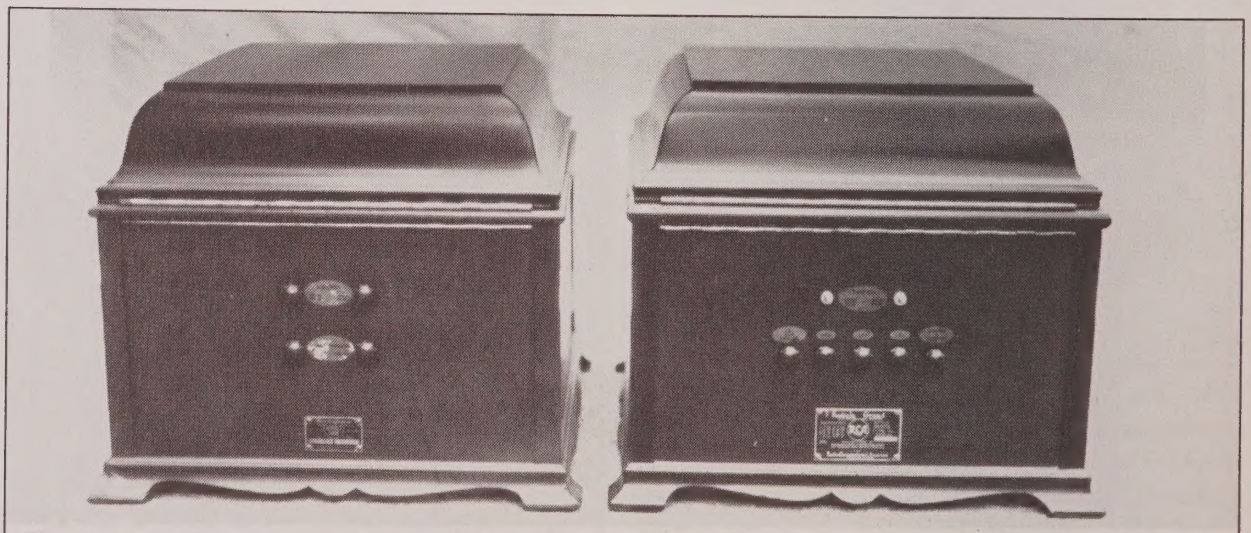


Fig. 6. Rear views of Aeriola Grand (left) and Radiola Grand (right). Notice the differing numbers of battery binding posts in the bottom row. The Aeriola Grand connects to one 6-volt storage battery, whereas the Radiola Grand uses four individual dry cells. The top row of posts, for the aerial connection, is the same on both sets; one can choose either "long" or "short" wavelengths.

Fig. 7. Lid decal for Aeriola Grand: "Westinghouse Elec. & Mfg. Co., East Springfield Works, Springfield, Mass."

Fig. 8. Radiola Grand lid decal: "Radiola Grand . . . Manufactured By Westinghouse Electric & Manufacturing Co., East Springfield Works, Springfield, Mass. U. S. A., for Radio Corporation of America."

CIRCUITS

Probably the most notable difference between the Aeriola Grand and the Radiola Grand, from the customer's viewpoint, is the ease of operation. Comparing the two receivers in Figure 5, the Aeriola Grand has only two controls to operate it, an on-off switch and a tuning control, whereas the Radiola Grand has five! Naturally, this is because of the differences in circuitry which lead to the reason the Aeriola didn't work very well.

The Aeriola Grand uses a very basic circuit of a detector and three stages of resistance-coupled amplification. A special plug (Fig. 9) is included with the Aeriola Grand and can be used to eliminate or bypass one stage of amplification, should the broadcast signal be strong enough to create excess noise. This is done by replacing the leftmost WR-21 with the plug. When not in use, this special plug is clipped to the inside of the lid on some models (Fig. 10) or stored in a ninth tube socket behind the row of ballast tubes as seen in Figure 1. There is a drawing of a standard-cabinet Aeriola Grand in Radio Enters the Home (p. 29) that shows the plug clipped to the inside of the lid near the hinge, but this does not necessarily mean that production models, such as the one in Figure 1, came this way. The Aeriola Grand is regenerative but it is fixed and cannot be adjusted.

The Radiola Grand's panel is somewhat different from the Aeriola Grand in its lay-out and has a few more controls (Fig. 5). The tuning is similar to that of the Aeriola Grand except that to the right of the tuning dial is a vernier adjustment. It can receive wavelengths from 180 to 530 meters (570-1670 kHz). As for reception, unlike the claims made in RCA's book Radio Enters the Home about the Aeriola Grand, the owner's manual for the Radiola Grand contains a disclaimer about how atmospheric conditions can interfere with reception, but it did go on to say that the receiver had "regularly reproduced in good volume broadcast programs from stations 1000 miles distant" [9]. The Radiola Grand, like the Aeriola Grand, is regenerative but has a tickler adjustment to the left of the tuning dial to control the regeneration.

In addition to these controls are two others at the rear of the radio panel behind the row of WD-11 tubes. The control at the left is a filament rheo-

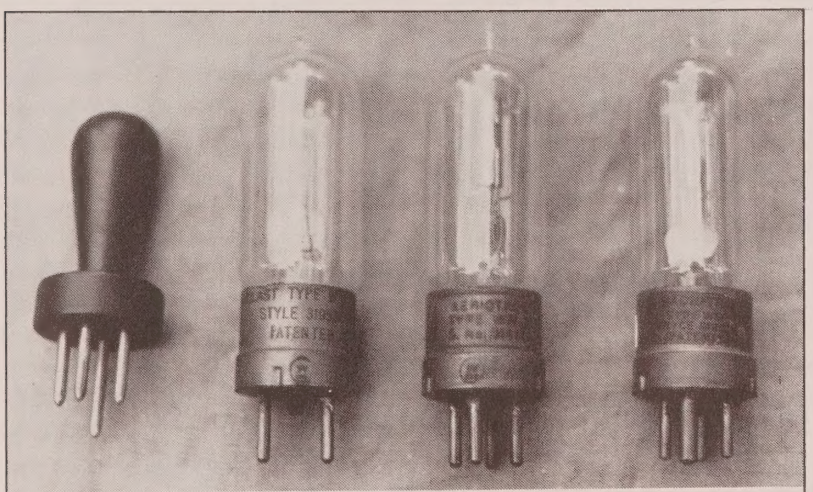


Fig. 9. From left: Aeriola Grand special or dummy plug, WB-800 ballast tube (note two-pin base), WR-21A amplifier tube, and WD-11 (note larger plate pin).

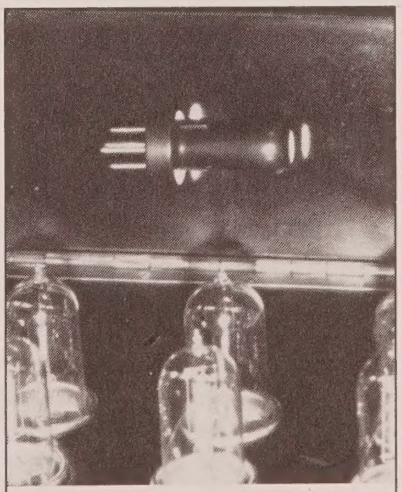


Fig. 10. Radio panel of the Aeriola Grand with special plug on the inside of the lid.

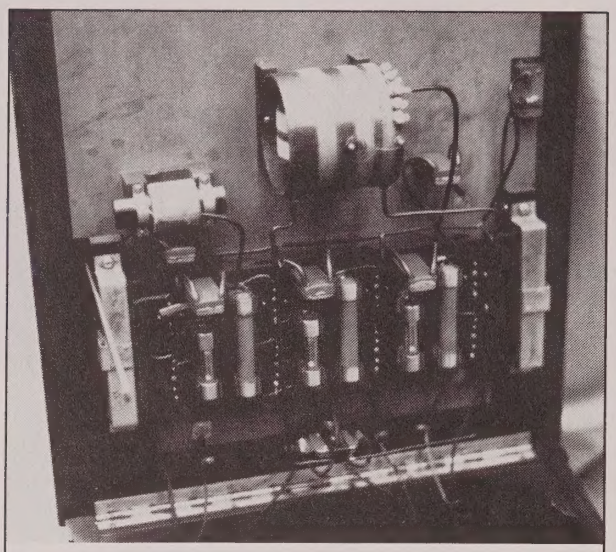


Fig. 11. Underside of the Aeriola Grand's panel showing the circuitry: a detector and three R-C amplifier stages. Connections are made with insulated, flexible wiring.

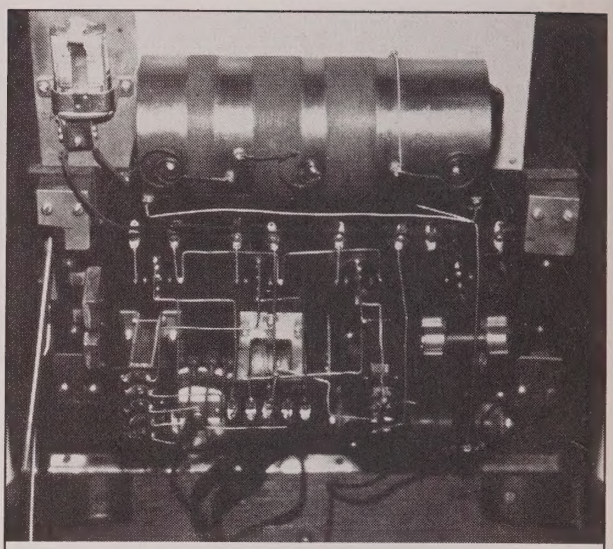


Fig. 12. Underside of the Radiola Grand's panel showing the circuitry: a detector and two amplifier stages. Connections are made with uninsulated, rigid wiring.

stat; the one on the right is the volume control. It is a six-tap switch that can be varied from "soft" to "loud." This switch puts resistance in shunt with the amplifier.

The circuit of the Radiola Grand is a detector and two stages of amplification. The rightmost tube is the detector. The second tube from the right is for the first stage of gain, while the third and fourth are connected in push-pull with a three-winding transformer.

SUMMARY OF IMPROVEMENTS

A summary of improvements from the Aeriola Grand to the Radiola Grand, is listed in a six-page letter [10], from the manager of RCA's sales department* to wholesale distributors. These can be excerpted as:

1. Four Aeriola [sic] WD-11 tubes, operated by four independent dry cells, used in place of the tubes formerly provided.

2. No ballast tube is employed but a filament rheostat is provided by which the low-voltage filaments of the dry-battery tubes can be connected to any type of battery giving a [nominal] maximum potential under two volts. The filaments thus may be operated from a two-volt storage cell or from 1½-volt dry cells.

3. A single-circuit tuner with continuously variable tickler adjustment is provided. This enables the user to obtain maximum amplification.

4. An intensity control is placed at the rear of the panel, enabling the volume to be cut down when the instrument is within 10 to 15 miles of a broadcast station.

5. A telephone jack is provided at the side of the box, enabling an external headset to be used in place of the loudspeaker.

6. A grid condenser and leak are provided for the detector tube.

7. The amplifier circuits are transformer-coupled, the second tube being an AF amplifier coupled to the detector bulb and the third and fourth tubes are the "push and pull" elements of a transformer-coupled second stage.

8. All tubes are mounted on a shockproof mounting, the detector tube being mounted on a second shockproof mounting supported on the first as an extra precaution against vibration.

9. The reproducing horn is mounted on rubber supports to avoid jarring the tubes by its vibration.

10. A three-volt bias battery, in the form of a flashlight unit, is provided for the amplifier tubes.

11. A condenser is connected across the "B" battery to aid in eliminating the noises inherent in some types of battery.

12. A new loudspeaker developed by Westinghouse is provided.

13. Terminals are provided whereby the common negative lead from all the 1½-volt dry batteries connects to a single binding post and the positive lead from each battery goes to a separate binding post. In this way each tube is fed from its own battery and the discharge of good cells through a poor cell, placed in parallel with it, is avoided.

14. Rigid form wiring is used throughout.

A NOTE OF APPRECIATION

I would like to thank my father, not only for the use of his two Radiola Grands pictured in this article, but also for the many hours we've spent in our common interests ranging from antique automobiles to antique radios. This helped me to gain an appreciation of an earlier time in America.

I would also like to thank Ed Bell for the use of

(Continued on p. 58)

* The initials on the circular are "EEB," for Elmer E. Bucher of wireless-textbook fame. - Ed.

BUILDING AN OLD-TIME WIRELESS RECEIVER

William F. Stokes
RD3, Box 300, Pittstown, NJ 08867

Design basics on a similar receiver appeared two years ago in the OTB but, of course, any real builder adds ideas of his own. The set was the centerpiece of an award-winning display at Rochester. - Ed.

INTRODUCTION

Back in the early part of the century, when the word "radio" was magic, the simple crystal set captured the imagination of experimenters. A coil of wire, a crystal, a pair of phones, and an antenna were about all one needed. Nothing came in a blister-pack - you built every part. KFI in Los Angeles was the first station heard on my simple set. When WW II was declared, I heard the news over that set.

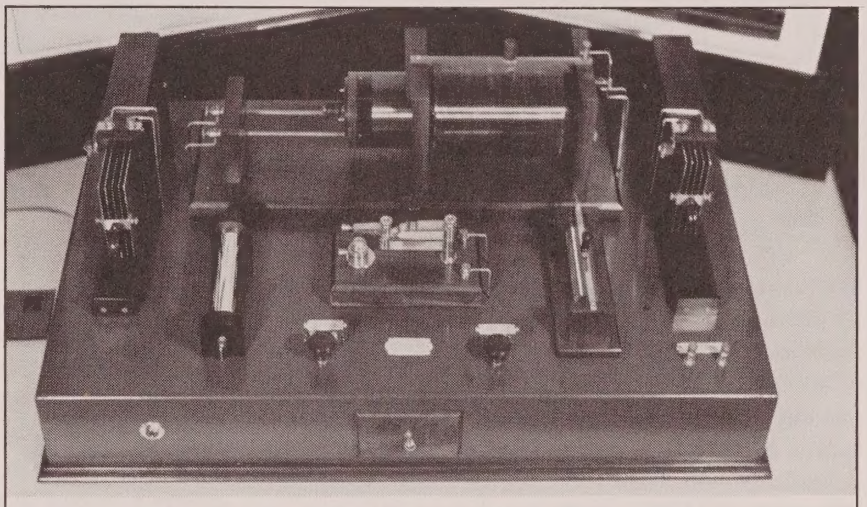
A loose-coupler crystal set in the February '92 *OTB* aroused ideas of construction. The set pictured is the second one made to date along the approximate lines of Alan Douglas' receiver. The first followed the article fairly closely. I took a different tack on the second one.

SLIDING CONDENSERS

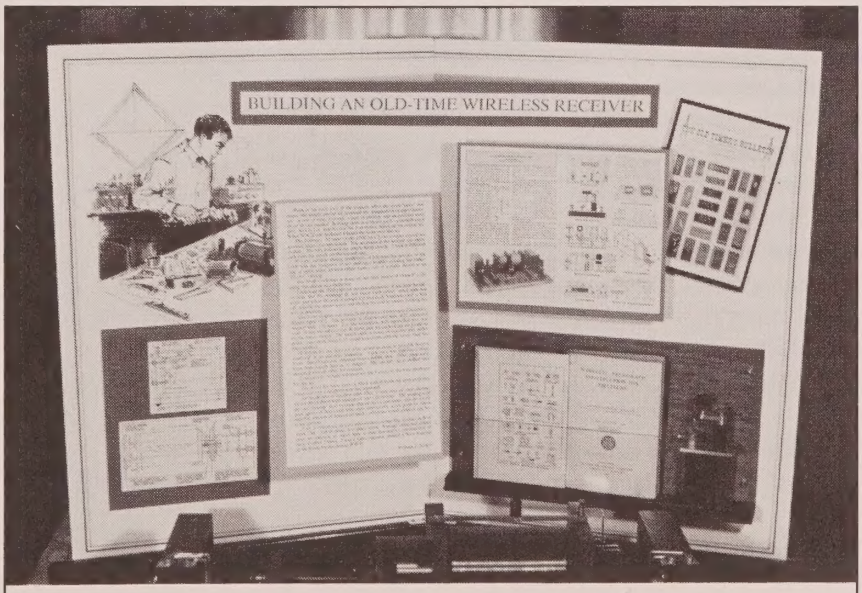
For the sliding variable condensers, I followed the scheme in the *OTB*, with the exception of not making a boxlike housing but rather one of open sides, an idea taken from a cut of a slider condenser shown in an old "Electro" catalog.

In lieu of using a wire connection, the accompanying sketch illustrates the method for making contact with one of the sliding plates. There were a few mistakes under my workbench before I worked out this contact method. The brass roller and adjustable tension spring insure continuous rolling contact, avoiding scratching sounds in the phones.

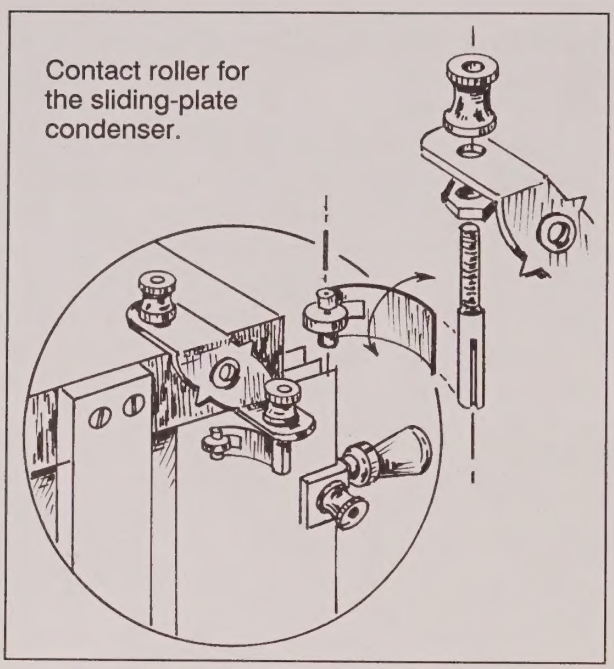
Walnut wood was used for the grooved boards that support the sliding condenser plates, and care must be taken to insure accuracy of the grooves. To obtain even and parallel grooves, lay out indexed markings for each cut and use feather-boards on the top and side of the work as material is pushed through the saw. This method keeps the work snugly to the surface of the table and firmly against the fence. Cut enough for both



The receiver. Sliding tuning condensers are at left and right. At front are (L-R) headphone condenser, detector mounting, and battery rheostat for detector. Battery drawer is in center front. Nameplates on binding posts are engraved on old, flat piano-key ivory.



The receiver and its Rochester display. Backboards are foam-core art board that slips into a slotted baseplate for support. Contents include a construction drawing for the loose coupler, a text explaining some construction methods used, the original *OTB* story on a similar set, a copy of A. P. Morgan's 1911 Wireless Telegraph Construction for Amateurs (source of some construction details), and a spare crystal detector. Several display elements are spaced out slightly from the backboard for a three-dimensional effect.



Contact roller for the sliding-plate condenser.

sliders, and a little extra wouldn't hurt. Walnut is expensive - give it a go with pine first!

The blade used for the grooves is a Milwaukee No. 48-40-3600, 36 teeth with carbide tips. It cuts cleanly with a smooth, thin groove.

The sliding plates are made of aluminum from the local hardware. One sheet will yield enough for the 22 required pieces. I didn't have the benefit of a machine-shop bench shear - I used a large paper cutter. Before each cut, the aluminum was clamped to avoid "squirm" and the blade was wiped lightly with oil to avoid galling. Slight curling of the plates occurs with this method. Flatten the plates, a few at a time, by clamp-squeezing them between two even hardwood boards in a machine vise.

To true up the plates, take about half of them and jog together the long edge. Keeping the jogged edge together with tape, clamp plates between two hardwood boards and expose about ¼ inch of the plates above the boards. Use a good file and draw-file the assembled plates flat and square. Do the same thing to all the other edges. After the plates were squared and all even, I removed the burrs on all edges, then resharpened the paper cutter (!).

FIXED CONDENSER

The fixed condenser is made of two thin sheets of brass 4" x 24", using thin plastic as a dielectric.

POTENTIOMETER

I followed the *OTB* plan for the potentiometer. Care must be taken here that the windings do not touch each other: wind with two wires and when the coil is completed and each "business end" is tied off, remove the spacer wires and shellac the coil to ensure holding the wire in position.

LOOSE COUPLER

The loose coupler was made from plans in *Elementary Electronics*, March-April 1971. The primary is close-wound with #22 enameled magnet wire, 175 turns. For the secondary, #26 enameled wire was used. A tap was taken every 46 turns, one for each of the six positions on the rotary switch. The switch plate is made of bakelite and switch points came from brass 8-32 round-head bolts with the heads filed flat and polished.

CRYSTAL DETECTOR

All details for the detector were scaled as closely as possible from a small cut in an old-time magazine. Each part was machined from brass. Sheet brass was obtained from a hobby shop. Other parts were from lamp-supply houses, re-shaped. The crystal cup is drilled and mounted with an offset for rotation.

DETECTOR BATTERY

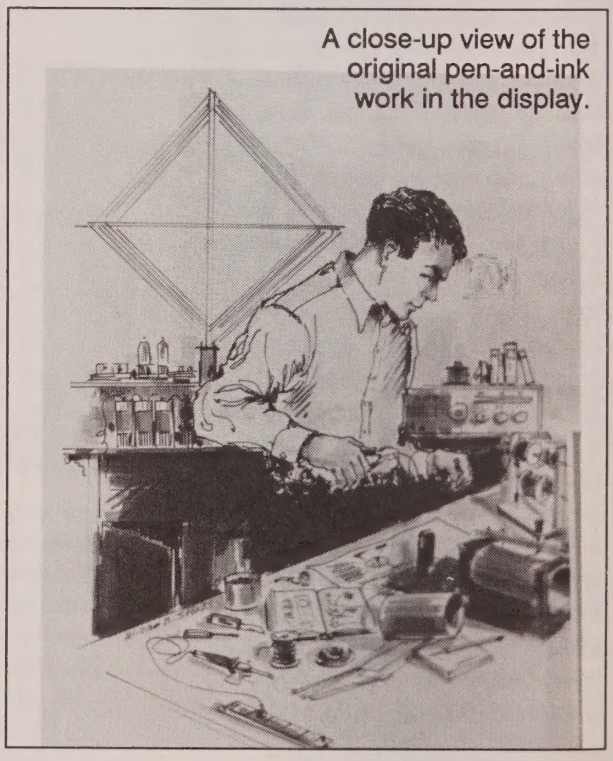
I decided to include a drawer for the battery in the base platform for this set.

WOODWORK

The wood for these parts is black walnut from my own property, rough-sawn by a neighbor who has a sawmill.

All hardwood is finished with filler, a thin coat of clear shellac, then rubbed down with linseed oil and rottenstone. The waxing is of my own making: pure beeswax shaved into a container, dissolved with pure spirits of turps and little pure linseed oil. Care must be taken with the amount of linseed oil used - otherwise wood surfaces can become gummy.

I am a retired art director who worked on the Big Avenue in New York City - still do some free-lance work. Vintage radio has always been my interest, so much time is now devoted to construction of these Golden Oldies. I was a radio operator aboard a Navy flagship in the South Pacific during WW II.



A close-up view of the original pen-and-ink work in the display.

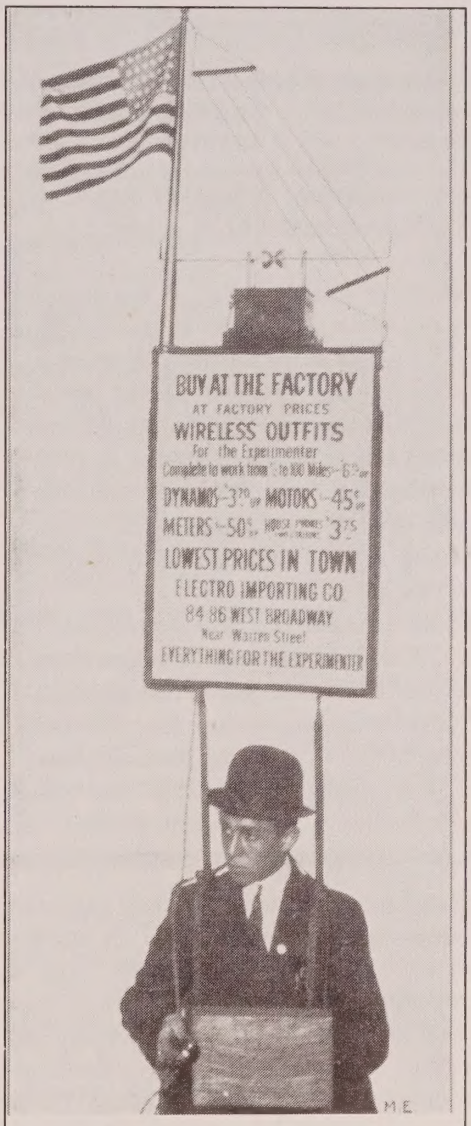
"FOUND AT BLOOMFIELD," 1993

Larry Babcock
8095 Centre Lane, E. Amherst, NY 14051

You may feel that antique-radio flea markets look more picked-over each year, with fewer really nice things displayed. Even so, you can occasionally find something really appealing. After all, you don't plan to bring home everything you see.

I attended the AWA meet in Bloomfield last May and, although not locating a long-sought Branston or Larcophonic, was able to find some early *Modern Electrics* magazines. Some had missing covers but all were very readable and contained a lot of information about early wireless. All eight of them were from 1909-10, with some tidbits that you may find interesting.

For example, how about an article and picture of the "first" man-pack radio station? Described on page 363 of the January 1909 issue, it was called a walking wireless station. The operator was strolling in Times Square in New York while supporting a complete wireless transmitter including two small antenna towers, a ½" spark coil, a key, batteries, a large sign and even a (46-star) U. S. flag. To make it more entertaining, the sign was an advertisement for the Electro Importing Company (E. I. Co.) which we all know was founded as the first radio store in the U. S. by our friend Hugo Gernsback to sell wireless equipment to amateurs, at the same time as Gernsback was editing *Modern Electrics*.



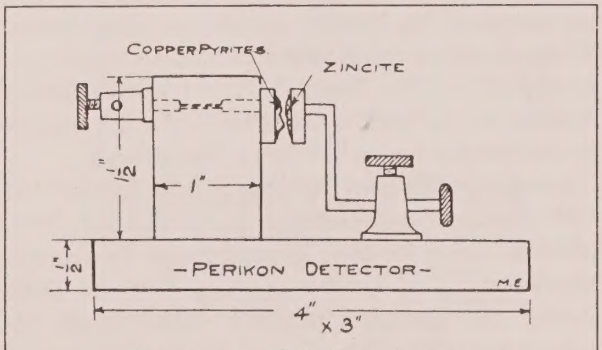
Hustling "wireless" in Lower Manhattan

It was stated that the noise produced by the spark was so loud that it could be heard for two blocks on Broadway despite trolley cars, automobiles and heavy wagons. It was said that the sign stopped the busiest man as soon as the noise of the spark was heard and that the operator never dared to stand still because he was then surrounded by hundreds of people asking for information!

Another article in the same magazine written by Dr. Lee de Forest described a series of "aerophone" (voice) tests he had made for the British Admiralty. Dr. de Forest demonstrated voice-modulated radio transmission for a distance of up to 50 miles between Portsmouth harbor and a ship in the English Channel. Remember, this article was published in January 1909!

At 50 miles' range de Forest was reportedly able to transmit and receive 154 random numbers by voice with only two errors, through heavy Morse-code interference. It was claimed that this feat would have been impossible with a wireless telegraph of equal power. It was said that a Perikon detector could be used up to 30 sea miles but the signal was as faint at that distance as with the audion detector at 50 miles. Another article, in the May 1910 issue, explained that the Perikon (*Per*fect *Pick*ard *Con*tact) detector consisted of two series crystals in contact with each other, rather than a cats-whisker and one crystal. The two crystals were zincite and copper pyrite. The detector mechanism allowed the crystals to be positioned for the best contact between the two crystal surfaces, as shown in the figure.

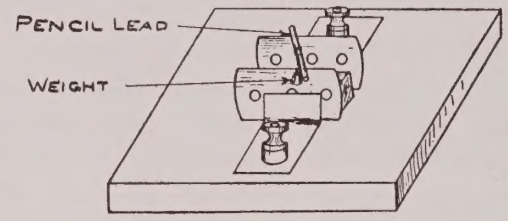
In the February 1909 issue I found an article describing the 10-year history of wireless telegraphy. I must admit that I didn't know that the transmission of voice messages had

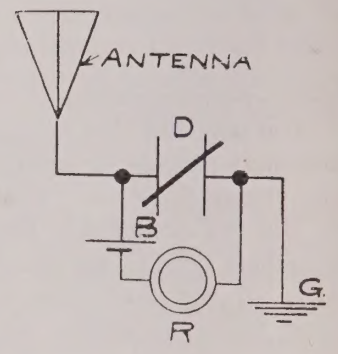


A do-it-yourself Perikon detector

a 10-year history as of 1909!

A razor-blade detector was described in the January 1909 *Modern Electrics*. It was made of two Gillette razor blades mounted on an insulating base of paraffined wood, and held against a block of wood by two brass springs with binding posts. A piece of pencil lead was laid across the blades. A piece of incandescent lamp filament with a small weight fastened to its center could be used instead.



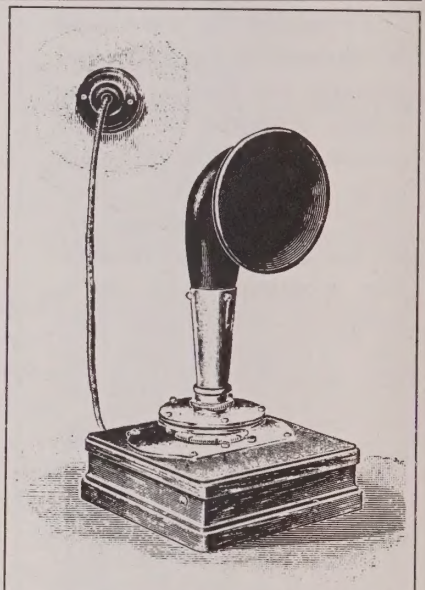


A razor-blade imperfect-contact detector, generations before the Gillette-blade "fox-hole radio" of WW II, and a receiver using it.

The figure shows the connections of the detector. A telephone receiver (headphone) and a dry cell were connected in series with the detector. The detector could be made more sensitive by using a potentiometer in series with the battery and receiver. I had heard of razor-blade detectors before but not in enough detail to build one and try it out. Of course, this circuit has little selectivity but in 1909 everything was in code and in the same RF band. Your ear was able to select (tune in) the tone of the desired code signal. Today this circuit would receive all the strong signals simultaneously, but it would still be fun to build one and try it.

The April 1909 issue reported on a recent German development called a "Lautsprecher" or Loudtalker, i. e., an early horn speaker. The only difference was that the resistance was said to be 10 to 15 ohms, for its intended use with telephone equipment.

Well, that's my story. Keep going to meets and keep looking. You may not find items as frequently or as spectacular but there are still things out there to enhance your collection.



The Lautsprecher, handy around the office for remote dictation, etc.

(Continued from p. 5)

from CDs and of the continuing need for operating funds for the Museum, authorized him to place funds in higher-yielding instruments.

Publications. Ludwell Sibley reported on this effort. The Board approved production of Review Vol. 9 in 1994, and expects a proposal in May for a new printing of one of the out-of-print volumes, to be chosen from member inputs received by then.

Membership. Joyce Peckham reported 3705 U. S. members, 173 in Canada, and 153 elsewhere, totaling 4031 and up about a percent over 1992.

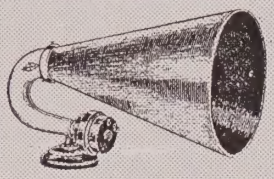
Meets. Richard Ransley reported on regional and joint meets over the year. He pointed out the growing requests for "loaner" videos, vs. slide shows. Sibley describes the NJARC proposal for joint operation of the 1994 Tranquility meet, with expanded staffing and publicity. President Roloson's motion to endorse this proposal carried unanimously.

Annual Conference. William Fizette covered the 1993 Rochester Conference and plans for 1994, which will be in the same general form. To improve administration of the flea market, Bob and Mike Raide will manage operation with overall responsibility still held by Ed Gable. As an "interest" item, Ed explained how spaces available in the market had expanded: 162 in 1991, 215 in 1992, 255 in 1993. Spaces unused at the start of the 1993 event resulted from the hotel's placing the boundary fence so as to expand the count; everyone who wanted space got it, all spaces were sold, and activity overflowed to the grassy area as in past years.

Lauren Peckham went into 1993 programming and 1994 plans, with its Telegraph Sesquicentennial and Radio in Wartime themes. The Book Fair continues to grow, in both vendors and operating hours. The 1993 programs drew an average of 120 viewers per session. Special thanks go to the Pittsburgh Antique Radio Society for its help with the "Westinghouse" theme.

Museum. Bruce Kelley covered operation of the Museum, with its special group tours (seniors, Scouts, Rolls-Royce/Bentley Vintage Car Club, fifth-graders). Biggest changes for '93 were the WW II avionics exhibit and prewar facsimile machines. The Museum loaned equipment to 10 historical societies and museums over the year.

State Charter. Sherwood Snyder announced that an application is on file to renew the Museum's three-year New York State charter for a five-year term [granted as of December]. - LAS



THE LOUDSPEAKER

EDITED BY
FLOYD PAUL, W6THU
1545 Raymond, Glendale, California 91201
All correspondence requires SASE for reply

MANHATTAN ELECTRICAL SUPPLY CO. INC.

In the early 1920s, the Manhattan Electrical Supply Co. Inc. (MESCO) of New York City had been making a line of "Red Seal" parts for the radio trade, such as batteries, variable condensers, headsets, and phonograph attachments. Ads in the Spring of 1924 offered a horn speaker, describing it as 30" high; with a fiber neck and bell, black crystalline finish, a "concert modulator" adjustment (volume/sensitivity control); and selling in the $25 range. The adjustment arm stuck out the side of the base, which was taller than it was round.

2551 (Paul Collection).

A shorter based horn with fiber bell, 22" high, soon appeared. It had a mahogany finish. Ads noted that the adjustment feature was located under the base. Typical of horn-speaker manufacturers of the time, MESCO didn't identify model numbers until several months later. Two cabinet models followed the two upright horns in 1924; the larger cabinet model was 50% bigger. A December 1925 announcement in *Radio Retailing* said of a new "Symphonic" wood-cabinet model that it was a nondirectional reproducer with housing openings on four sides and a mahogany finish.

The author's 2551, a large cabinet, contains a neck and bell with a 25" to 30" air column. It sounds fairly decent for a horn speaker. The 2556 Symphonic was the most expensive horn of the line, probably having low production quantity, and is a much-sought-after item. The author acquired his Symphonic at an auction in Dallas three-plus years ago.

Model	Description	Dimensions
2551	Cabinet, one side open	8" x 11" x 16"
2552	Cabinet, one side open	13" x 9" x 9"
2554	Manhattan Jr., fiber bell, short base	22" high, 10" bell
2555	Manhattan, fiber bell, tall base	30" high, 14" bell
2556	Symphonic, four sides open	15" x 8" x 12"

Left: 2554 (Merrill Bancroft Collection); right: 2556 (Paul Collection).

Manhattan Cabinet Type Loud Speaker No. 2551

The Manhattan Cabinet Type Loud Speaker will satisfactorily operate with any good receiving set employing audio frequency amplification. No batteries are required for its operation.

Connect Properly to Set

For best results the terminals of the cord of the Loud Speaker should be properly connected. The cord having the colored tracer thread should be attached to the + binding post of the receiving set. If the + post or terminal is not known, reverse the connections until the best results are obtained.

The "Concert Modulator"

Underneath is an opening to permit regulation of the famous Manhattan adjustment known as the "Concert Modulator." This adjustment accommodates the Loud Speaker to set, tubes, and strength of "B" battery current. After your set is operating and the volume has been satisfactorily regulated in the set, turn the "Concert Modulator" to LOUD or SOFT until the most pleasing quality results. After the adjustment is made, it will seldom be necessary to change the setting. Increase or decrease the volume desired by adjusting the amplification of the receiving set.

MADE IN U. S. A. BY

MANHATTAN
ELECTRICAL SUPPLY CO., INC.
NEW YORK CHICAGO
ST. LOUIS SAN FRANCISCO

"Makers of the famous Red Seal Dry Batteries, Manhattan and Red Seal Radio Products."

Instructions on bottom of 2551 (Paul Collection)

COLLECTING ANTIQUE RADIO LOGOS

Carlos Alberto Fazano
C. Postal 25, Osasco, São Paulo. Brazil 06001-970

Microphones, loudspeakers, valves, old magazines and books are typical objects of today's search by collectors for antique radio memorabilia. This search is part of the perennial research work of radio historians and dedicated collectors. One such field, collecting and preserving antique radio logos and nameplates, is a fascinating and rewarding task.

Logo is an abbreviation of *logotype*: from the Greek "logos," knowledge, and "typos," an impression or type. It was originally a typographical term, a word or several letters cast as one unit, basically used for representing a trademark.

Logotypes flourished during the radio boom of the late Twenties and the Thirties when innovation meant market share. New industrial design techniques helped manufacturers improve the styling of radio cabinets to meet public demand. Soon logotypes became integrated parts of radio-set hardware, intended as a distinctive marketing touch of each brand.

Microphones, the symbol of the broadcasting age, generally display the manufacturer's logo, like this vintage RCA 44B.

Mass production induced the development of such new materials as plastic resins and light-metal alloys (aluminum, antimony, etc.) formed by several industrial processes (pressing, casting, stamping, engraving).

Where to find antique radio logos? Like such other small parts as knobs, escutcheons, and chromed friezes, they are found at random. The places to look for them are old radio-repair shops and junk yards where scraps of radio cabinets can be found.

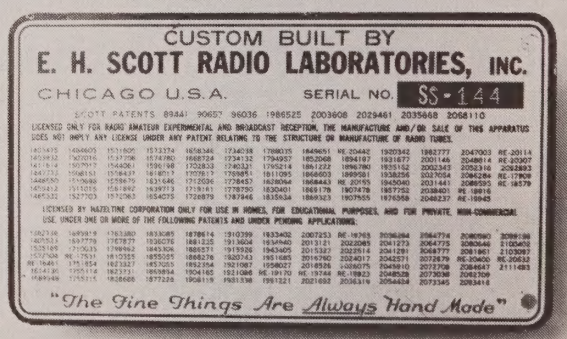
The plate or logo should be removed from the panel or chassis and carefully cleaned or restored if necessary. The appearance of plastic logos can be improved after cleaning by just rubbing with furniture polish. Black plastic logos where the white filler of the engraving is worn out, should be cleaned as above and then filled with new white acrylic lacquer, scraping off the surplus paint with a rubber knife and letting it dry.

Regarding metal logos, first clean them and then buff relief lettering and lining with a hardwood block. The plate should be placed on a hard surface to avoid damage.

After this restoration procedure, the plate surface should be painted with clear spray lacquer. Finally, as soon as the surface is dry, rub off paint and buff it with a metal polish using the same hardwood block. When the lettering is bright, wash off the metal polish and buff the plate surface with furniture polish.

Shop chemicals such as metal and furniture polishes and spray paints are similar everywhere, differing only as to brands and trade names. To avoid confusion, the specific products used by the

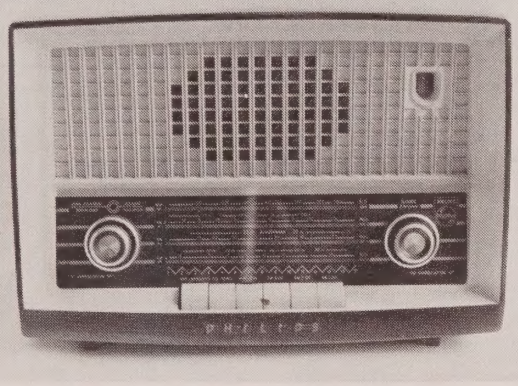
Metal logos on radio panels or grilles.



An E. H. Scott nameplate with the famous motto "The Fine Things Are Always Hand Made." Nameplates are another interesting aspect of collecting radio logos. Besides such information as model, serial, and electrical ratings, the indication of patent and license agreements is useful in determining the set's year of manufacture as well as its technical improvements.

Grouping the items by origin or nature is a practical way to organize a logo collection. Here is a group of metal logos related to audio equipment from American makers, with a replica of the famous Victor dog Nipper.

A group of metal and plastic radio logos produced by European manufacturers.

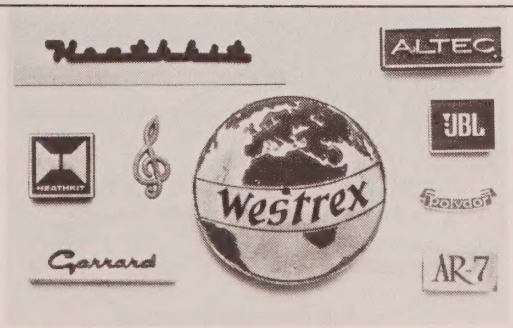


Radio from the early Fifties displaying at the bottom of the plastic cabinet attractive metal lettering indicating Philips as the brand.

Metal and plastic logos representing some vintage radio manufacturers, mainly American. Before modern letter-printing techniques, radio panels were equipped with identification plates like "PHONE."

Attractive metal logos of Brazilian radio and TV makers of the '50s and early '60s.

The Western Electric logo for movie sound systems, generally displayed in theatre lobbies. This is a reproduction made by the Brazilian collector Luiz Carlos Rei.



Metal and plastic logos of American, British, and German hi-fi manufacturers.

The treble clef starts a musical staff to indicate the pitch of the following notes. Emerson radios used this symbol in their logo, and an old-time ring-mount microphone!

TECH-MANUAL ART - ANOTHER LOOK

Source material from **Louis Meulstee, PA0PCR**
Smetanalaan 28, 3122 HP Schiedam, Holland

In response to "Tech-Manual Art" (*OTB*, Nov. 1992, p. 47), Louis Meulstee, PA0PCR, came up with a huge variety of additional cartoon illustrations. His researches covered military technical manuals from Britain, Germany, Australia, and Canada; and even turned up five more illustrations from the unidentified artist "W. H." at Fort Monmouth. It's clear from these results that Britain and the Commonwealth countries spiced up their training material with bits of humorous artwork, more extensively and longer than the U. S. Even the Germans used a little. Here is a collection of this work. Much of it falls into specific categories, as shown below.

■■■■■■■■■■■■ DER FEIND HÖRT MIT! (THE ENEMY IS LISTENING TOO!) ■■■■■■■■■■■■

German poster, WW I: "[Use] caution on the telephone." *Source: Alan Douglas*

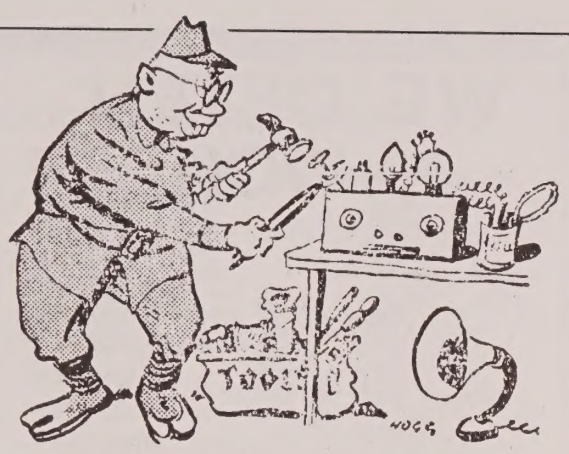
German, KlFuSpr.d (Klein FunkSprecher d., or Small Radiophone D), 1944. Examples are "**WRONG!** - Requesting Captain Müller, Second Company, for Captain Meier, First Company" and "**RIGHT**: - Requesting Falcon Leader for Typhoon Leader."

. . . German intercept operator

British, "All Informed, or a Staff Officer's Guide to Signals," 1943.

. . . Jap intercept operator

British, "All Informed, or a Staff Officer's Guide to Signals," India, 1943.



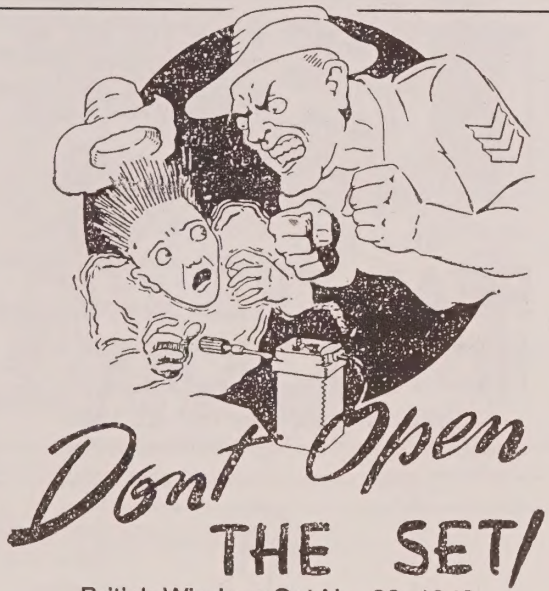
. . . it is possible for the enemy to set up apparatus

British, "All Informed, or a Staff Officer's Guide to Signals," India, 1945

DER FEIND HÖRT MIT
(The enemy listens too)

British, "Seven Steps to SLIDEX," 1944.

THE SERGEANT AS MOTIVATOR

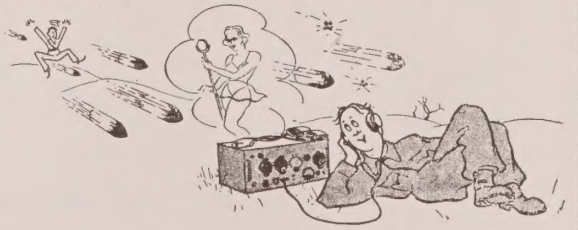


British Wireless Set No. 88, 1948

U. S. TM 11-859, SCR-593-A (BC-728-A), 1943. Tags on sets read "CHECK BATTERY - overcharged - not disconnected from mounting FT-338 (*)," "BUSTED - man-handled," and "BATTERY DEAD - left on all night."

Australian A-510, 1957

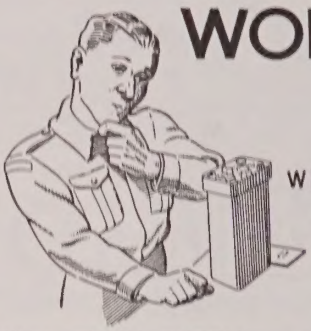
ALWAYS NET TO H. Q. STATION



British Radio Link Sound Ranging Mk. II, 1944.

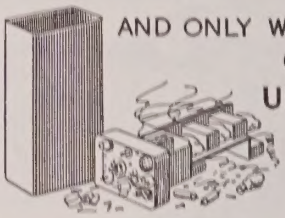
British Wireless Set No. 46, 1945.

WE OFTEN WONDER



WHY OPERATORS FACED WITH A NEW SET

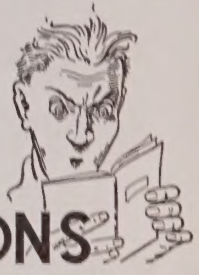
WILL TURN EVERY KNOB ——
SWITCH EVERY SWITCH ——
UNFASTEN EVERY BOLT ——



AND ONLY WHEN THE SET IS COMPLETELY UNSERVICEABLE

WILL THEY

READ THE INSTRUCTIONS

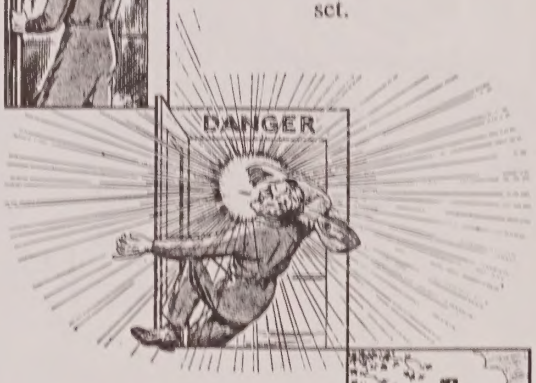


British Wireless Set No. 46, 1945

LIVE WIRES MEAN — DEAD MEN

Keep away from live circuits!

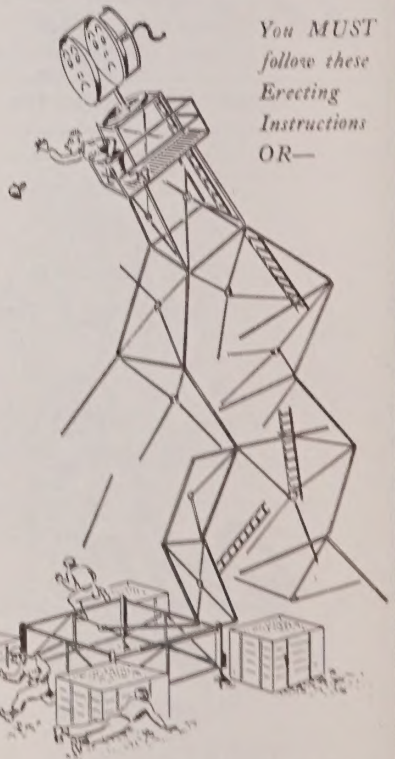
300 Volts DC encountered in this set.



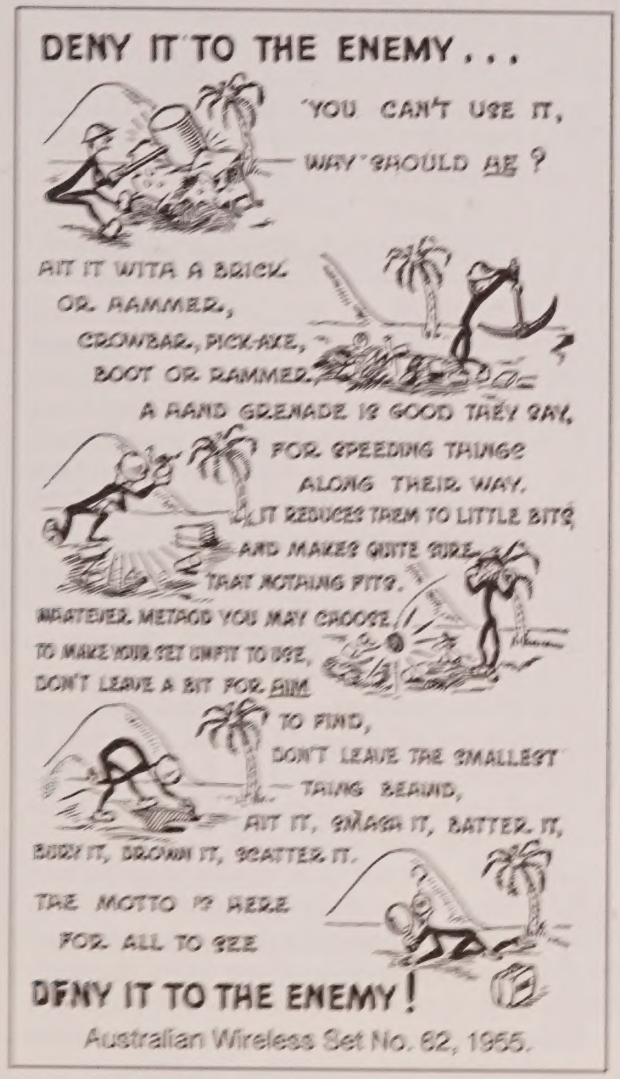
WHEN ADJUSTING ITEMS ON TRANSMITTER DECK (E. G., WHEN NEUTRALIZING) SWITCH TO "RECEIVE."

RAF, Air Publication 2528B, TR1464 transceiver, 1945.

British Wireless Set No. 42, 1945.

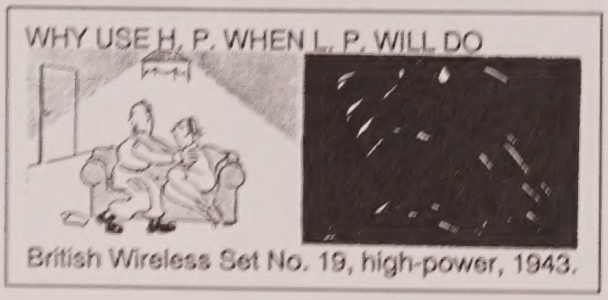


British Wireless Set No. 10, 1945.

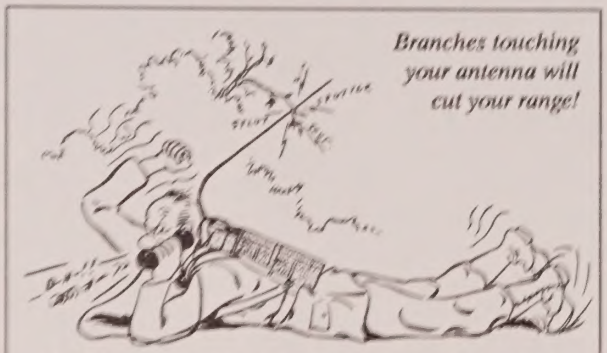


Australian Wireless Set No. 62, 1955.

British Wireless Set No. 19, high-power, 1948.

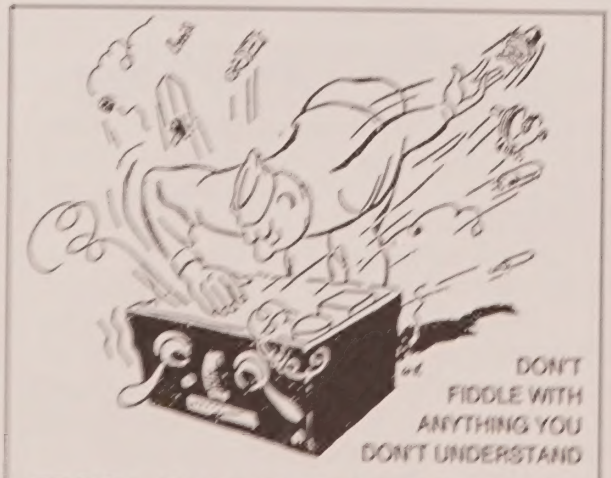


British Wireless Set No. 19, high-power, 1943.



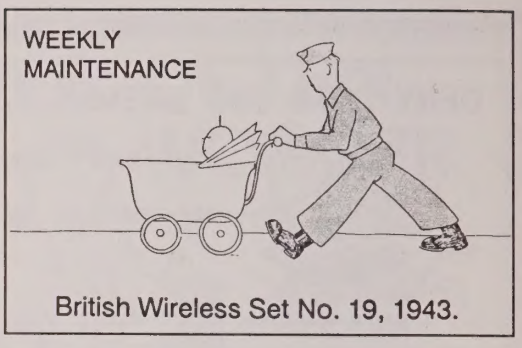
U. S. TM 11-242, SCR-300 (BC-1000), 1943.

TB SIG 5, "Defense Against Jamming," 1944.

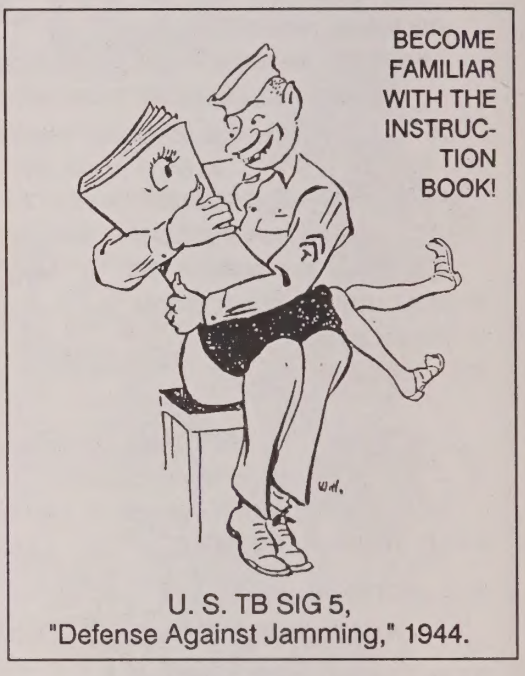


TB SIG 5, "Defense Against Jamming," 1944.

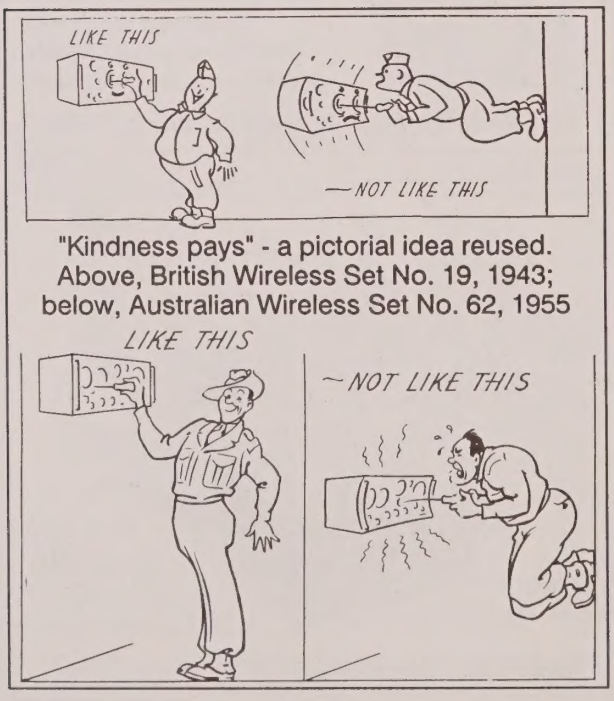
British Wireless Set No. 62, 1947.



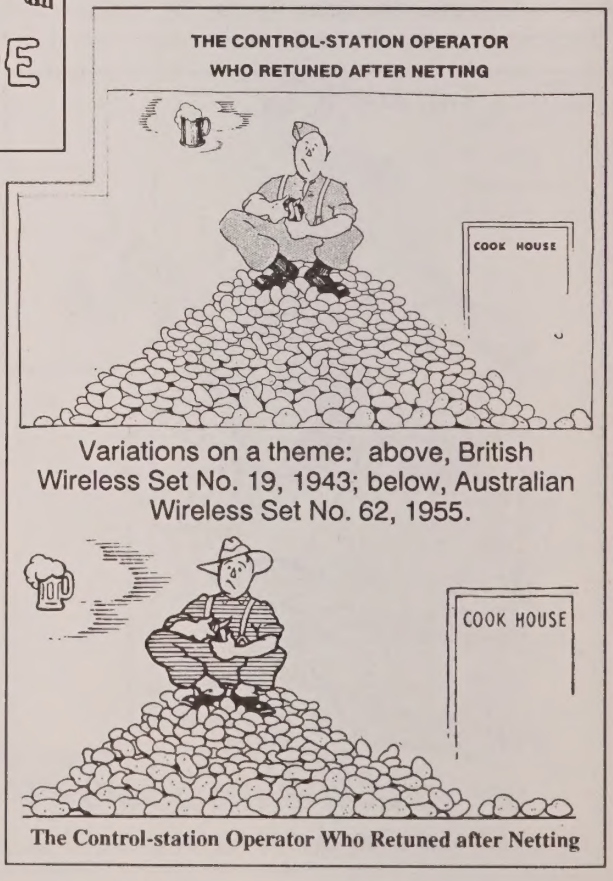
British Wireless Set No. 19, 1943.



U. S. TB SIG 5,
"Defense Against Jamming," 1944.



"Kindness pays" - a pictorial idea reused.
Above, British Wireless Set No. 19, 1943;
below, Australian Wireless Set No. 62, 1955



Variations on a theme: above, British
Wireless Set No. 19, 1943; below, Australian
Wireless Set No. 62, 1955.

The Control-station Operator Who Retuned after Netting

THE OLD-EQUIPMENT CONTEST - 1994 AWA CONFERENCE

Ralph Williams, N3VT
30675 Main R., Orient, NY 11957

1994 celebrates two themes: **150 Years of Telegraphy**, and **The Half-Century Since World War II**

The categories for the 1994 AWA Old-Equipment Contest are in three groups: Theme, Standard and Craftsman. The Theme categories cover the Conference's two foci, the telegraph and WW II. The Standard categories are for exhibitors bringing items from their collections rather than preparing something special for the annual theme. The group of categories, Craftsman, that began last year lets the craftsmen among us show their special skills in conservation and restoration.

THE MORSE TELEGRAPH CATEGORIES

1. EARLY WIRE TELEGRAPH EQUIPMENT. Extensive, point-to-point, electrical communication became practical when Samuel F. B. Morse combined scientific discoveries (electrical) with language concepts (coding). While emphasizing the processing of intelligence, he realized the need for practical electrical devices to prove his communication method. Alfred Vail was skilled in concepts and translating them into electromechanical hardware. Morse and Vail reduced the new system of communicating at a distance to practice. For this category the ideal entry would be an original Vail Correspondent or one of the Morse-type sticks. Even if these items are not in your collection (!), enter something that will tell about an early development of the electric telegraph. Don't forget the competition, e. g., House or Wheatstone. An excellent entry would be a typical 1800s operating telegraph office loop. Another would be a model of the Baltimore-Washington line. Displays of sounders, registers, relays or keys are welcome, but small items must be fastened or cased.

2. EARLY TELEGRAPH DOCUMENTATION. The telegraph system and its vicissitudes have been documented by many observers. A display of books on the telegraph and its contribution to the U. S. communication revolution would be very acceptable here. A copy of Vail (1845) or Reid (1879) would set the stage. An entry of telegraph advertising or service announcements will for a real contest.

THE WORLD WAR II CATEGORIES

3. THE SOLDIER'S RADIO. The radio was an important morale factor to soldiers, especially overseas. Some radios were designed for this use (Hallicrafters, Zenith). Others were adapted from commercial and amateur service. Still others were recovered from military operations that had been completed (successfully or otherwise).

4. THE RADIO THAT STAYED HOME. The war used virtually all of America's electronic effort. Some radios were built for the home market, others were adapted, and many received repair parts never intended by designers. Sets that "kept the home fire burning" are needed here.

5. MILITARY RADIO EQUIPMENT. This category is broader than its name suggests. A complete radar would be a good entry if it fitted our space. Main parts of the radar, a radio transmitter, airplane gear, or other electronic devices (coding machines or spy equipment) are welcome. If you bring a Gibson Girl, be sure she has her auxiliaries, e. g., the canvas case, kite, and balloon.

6. DOCUMENTS ABOUT RADIO IN WW II. Entries in this category can range from advertisements, Tech Manuals, propaganda, or military communications, to clandestine operations. The entry should relate something that occurred in wartime that is important to you. How about a set of pictures of your attending a Radio School at Fort Monmouth?

7. PROGRAMS FOR OUR FORCES. Much of the entertainment industry focused on producing programs and shows for the men and women serving our country. The USO played a big part, as did the Armed Forces Radio Service. Entries showing what was available are for this category. Real programs, played back to contest viewers, would be very effective - Tokyo Rose would bring back memories for Pacific veterans.

8. FOREIGN WARTIME RADIOS. While America made great use of electronics in the war effort, the other participants were busy with communication equipment of all kinds and uses. This category includes foreign gear that played a part in WW II.

9. TUBES FROM WW II. The period just before and during the conflict saw great advances in tube application. The VHF, UHF and microwave spectrum saw advances in high-power devices. An entry on the development of a war-time tube from its predecessors would be a fine display. CRTs would be pertinent. How about a Zahl tube?

THE STANDARD CATEGORIES

10. PASSIVE RECEIVERS. Any detecting device, not including vacuum tubes or solid-state amplifying devices, whose purpose is to convert radio energy into intelligence is sought.

11. ONE- AND TWO-TUBE RECEIVERS. Any receiver which uses one or two tubes for any of its functions fits here. A tube having multiple electron streams in one envelope counts as one tube.

12. THREE-TUBE RECEIVERS. The detector/two-stage is most often found here, but reflexes and special-circuit sets are sought.

13. FOUR- AND FIVE-TUBE RECEIVERS. Three-dialers, electric radios with some special feature, and others will be welcomed.

(Continued on p. 56)

THE VACUUM TUBE

EDITED BY

BRO. PATRICK DOWD, F.S.C., W2GK

MORE 201A BRANDS

Here are additions to the master list of brands for 201/201A tubes (*OTB*, Vol. 32 No. 3 [Oct. 1991], pp. 34-35). Those in *italics* were contributed by Ed Bell in North Carolina; the rest, by Lauren Peckham and various contacts at Rochester. We may hit the 500 mark yet! - **Bro. Patrick Dowd**

- *Cleartron*
- CPC (brass)
- Curtiss Energy Co. *
- Falco
- Halcyon
- *Iroquois*
- *Ranger* (brass)
- *Raytron*
- *Super Air Castle* (ST)
- *Trego*
- Universal (brass)
- Wavetone
- *WES*
- *World* (World Battery Co.)

* For sale on Cortlandt St., New York City.

GRIDLESS TUBES - THE ARCOTRON

Ludwell Sibley

The early history of the vacuum tube is full of attempts to make a "gridless" tube, in large part to avoid the De Forest grid patent which RCA controlled as the "radio trust." Examples include:

- The Weagant Valve, patented 1913, which used an external clip electrode [1] or a wrapping of wire about the outside of the tube (and apparently didn't actually work).
- The Welsh W. T. 501 Peanut Detector tube [2], another doubtful performer, and its close relative the Delta Midget [3].
- One of the early variants of the Moorhead tube [4].
- The Huth (German) PLAV.9 [5] and its U. S. cousin the Crosley Deflectron [6], which seems not to have "gone commercial."
- The Sodion detector [7].
- The Goddard oscillator, a magnetic-deflection tube. It reached commercial status as the electrostatically deflected C-100A, -B, -C, and -D made for Collins Radio, and marketed independently, by Amperex [8].
- The Heintz & Kaufman Gammatron, a high-power transmitting tube sold in the mid-'30s as the HK55, HK155, and HK255 [9]. H & K also made the HK5, a receiving tube of 201A size, of which at least two samples survive [10].
- Two oscillator tubes devised by TV inventor Philo Farnsworth: the "electron multiplier" [11] and the "multipactor."

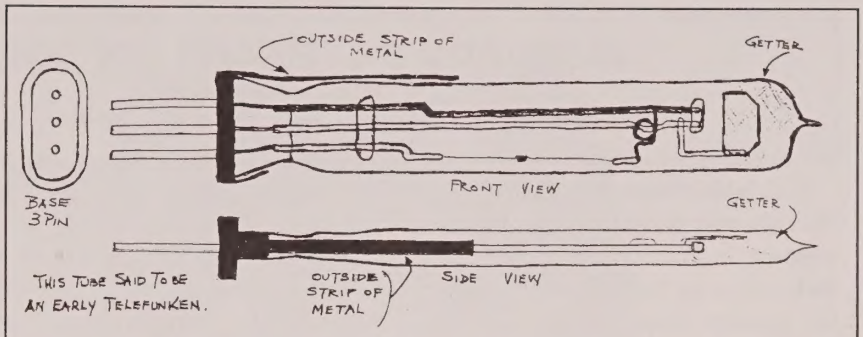
The Arcotron was a little known, commercial gridless tube that appeared in Germany, introduced by Telefunken in mid-1930. Based on the Weagant patent, it was named in honor of Dr. Georg Graf von Arco [12], one of the tube's developers. Since Telefunken had acquired part of the Huth company, there may have been a connection with the earlier Huth tube. Telefunken's literature referred to the tube as a "Stäbe," which they translated as "peg" [13] from the shape of its envelope.

This is an interesting design, looking much like one of the spray-shielded subminiature tubes of the '40s blown up to double size. Here, however, the zinc coating flame-sprayed onto the outside of the glass is not a shield, but the *control element* [14] (dare we use a modern term like "gate"?). Inside is a filament, made relatively massive for low-hum 50-Hz AC operation and drawing 200 mA at 1.0 V. It runs near one of the short side walls of the glass. The plate parallels it, at the other narrow side of the envelope (see the drawing). This allows the outside control element to influence the electron stream via electrostatic coupling. There is no need for a coupling capacitor between stages - the tube provides its own. Apparently the tube was suited to AC operation: stage gain at 50 Hz was only about 1% of its value at 1000 Hz [14], giving low hum despite the use of AC on the filament. The glass used for the envelope was of a type giving relatively low resistance. The small leakage of the glass wall was said to serve as the leak resistor in a "grid"-leak detector.

The amplifier Arcotron was the 301, the "hard" or high-vacuum version. It was, however, suited only for audio frequencies. A "soft" (gas-filled) version was found desirable as a detector, so a 201 was sup-

plied containing a trace of mercury vapor.

The tubes were designed to be inexpensive, priced comparable to a 25-watt light bulb. They were used in a low-cost receiver, the Telefunken 12W "Arcolette," having only a regenerative detector and two audio stages but feeding a speaker. The schematic diagram below shows the circuit, which is "simplicity itself." The output tube was a conventional triode. The Arcotron was abandoned only a year after introduction; it was not common enough to appear in the 1946 P. H. Brans Radio Tube Vade-Mecum, but *is* listed in the recent Röhrencodierungen [16]. It is described briefly on p. 445 of Saga [1].



An Arcotron, as drawn by Joseph Fetsch in 1955.

A 1955 Telefunken letter [12] referred to the tube as the *RE* 201 and 301, in variance with earlier and later naming. It quoted approximate parameters for the two tubes as follows: RE 201, E_p 150-180 V, E_g -2.5 V, μ 6.7; RE 301, E_p 80 V, E_g 0 to -2 V, μ, 2.5. It also reported that variants had been made with the seal-off coated in blue, vs. red, lacquer. It advised that the tubes were covered in greater detail in the October 1930 issue (No. 55) of their publication *Telefunken-Zeitung*.

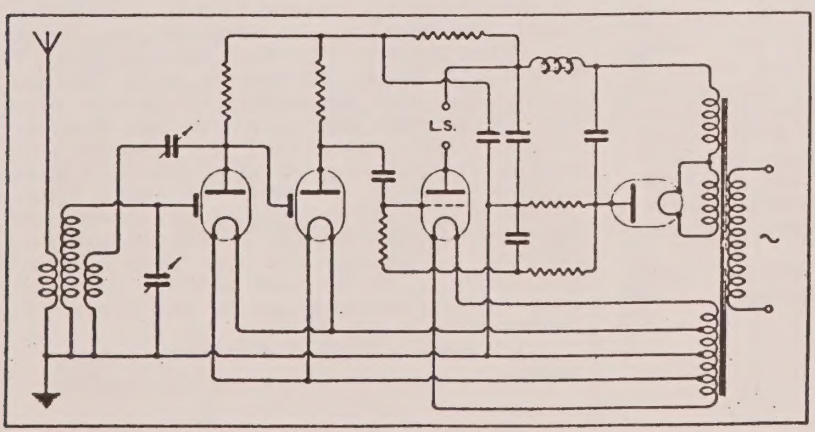
These tubes are scarce in North American hands, but one appears in the Fetsch Collection (AWA Review, Vol. 8, p. 113). An unfortunate tendency of spray-coated tubes, the surviving Arcotrons included, is for the coating to crack and peel off. Checking with collector Lauren Peckham, an Arcotron in his possession is missing most of the coating. This is helpful in a way: it allows examination of the construction. Lauren's has red lacquer at the seal-off end. A small spring clip, not shown in the photo, provides for connecting the coating to the socket. Strangely, Lauren's Arcotron sample appears to use platinum lead-out wires in the stem press, a construction which had disappeared (in favor of inexpensive Dumet wire) ten years earlier in American tubes. The drawing by Joseph Fetsch seems to show this construction also.

ACKNOWLEDGEMENTS

It is remarkable what one can learn by contacting several individuals, each of whom can contribute information. My thanks to Bro. Patrick Dowd, Lauren Peckham, and Jerry Vanicek for ideas and documents!

REFERENCES

1. G. F. J. Tyne, "The Tube Collector," *OTB*, Vol. 13 No. 2 (Dec. 1972), p. 11; G. F. J. Tyne, Saga of the Vacuum Tube, (Tempe, AZ: Antique Electronic Supply, 1977), pp. 180-181.
2. G. F. J. Tyne, "The Tube Collector," *OTB*, Vol. 18 No. 1 (June 1977), p. 27.
3. Pictured in *AWA Tube Collector Fact Sheet*, Vol. 5 No. 4 (Nov. 1980), p. 1.
4. W. F. Condon, "Moorhead and the Electron Relay," *OTB*, Vol. 29 No. 3 (Nov. 1988), p. 13; Saga, pp. 168-169.
5. "An Odd Tube," *OTB*, Vol. 8 No. 4 (Mar. 1968), p. 7.
6. B. Kelley, "The Crosley Deflectron," *OTB*, Vol. 31, No. 3 (Oct. 1990), p. 45).
7. Saga, pp. 336-341.
8. M. D. Hall, "Robert H. Goddard and The Goddard Oscillator," AWA Review, Vol. 7, pp. 151-154.
9. Radio Handbook, 1936 ed., p. 206; and 1937 ed., p. 260; also reproduced in [8], pp. 156-157.
10. Information from Bro. Patrick Dowd, Dec. 7, 1993.
11. A. H. Halloran, "Farnsworth's Cold-Cathode Electron Multiplier Tube Uses Neither Grid Nor Filament," *Radio*, Oct. 1934, pp. 6, 14, and 18.
12. Letter, Telefunken GmbH, to Joseph Fetsch of the New York Navy Yard, Aug. 12, 1955, by courtesy of Jerry Vanicek.
13. - , "Gridless Triodes," *Experimental Wireless and The Wireless Engineer* [British], Jan. 1931, pp. 1-3.
14. - , "The German Radio and Phono Exhibition," as [13], Oct. 1930, p. 534. The tube was apparently also written up in *Wireless World*, Sept. 10, 1930, p. 244.
15. Review of German tube literature (*Rad., B., F. f. Alle*, Aug. and Sept. 1930, pp. 371-172 and 387-388; *Die Sendung*, Aug. 22, 1930, p. 526), as [14], p. 571.
16. G. Salzmann, Röhrencodierungen der 20er und 30er Jahre (Bochum, D. Winkler, 1988), p. 122.



McMURDO SILVER AND HIS COIL PATENT

Alan Douglas
Box 225, Pocasset, MA 02559

McMurdo Silver, for all his inventiveness, received only one patent, for a plug-in coil drawer. Its primary feature was the double row of sliding contacts, allowing two drawer positions: all the way in for general coverage, and pulled part way out for bandspread. Silver used it only in his model 3A communications receiver, first advertised in *QST* in March 1933 (the coil alone in February). Sales must have been limited, as it was not advertised beyond October, when it was superseded by the more elaborate 5A. Postal Radio in New York City offered two models from July 1933 to 1935, using this plug-in drawer.

Silver apparently had delusions of grandeur when his patent issued on December 1, 1936, claiming that it covered all plug-in coil drawers. He went right after National, writing to his old acquaintance Jim Millen, "cordially" inviting him to take out a patent license. As you can see from the exchange of letters, Jim equally cordially invited Mac to take a hike.

Silver should have known better, since the plug-in coil drawer was several years old before he applied for his patent. Westinghouse had used four coils side-by-side on a common panel in its RO-2 submarine receiver (June 1930) and Aircraft Radio Corp. was using a similar arrangement also (described in

McMurdo SILVER CORP.
DIVISION OF G. P. H., Inc.
2900 South Michigan Ave., Chicago, U. S. A.
Telephone Calumet 6309

December 22nd, 1936

Mr. James Millen
c/o The National Company
Cambridge, Mass.

Dear Jim:

You have probably heard rumors that I have had a patent application in covering fundamentally the coil change system that you have used in the HRO and NC100 receivers. The patent in question has just been issued and I am enclosing a copy for your perusal. I suppose I should not write you this letter but should have our attorneys do it. For old times' sake and friendship, however, I am writing you direct to suggest that it may be simpler and less expensive if you want to consider this patent yourself and let me know why you think you are not infringing. I think you are, and upon such assumption am suggesting that a license on quite reasonable terms would be available to the National Company.

The next move I am now leaving up to you with, however, the thought that we are both familiar with the good old custom of tabling letters suggesting patent infringement until action is taken. I think it would be a fine idea if you didn't do that in this case but wrote back promptly your thoughts on this subject. I suggest this as I am certain that between us we can handle the whole matter pleasantly and amicably. If I am mistaken and you prefer to follow the usual policy of inaction, I shall by the first of the year contact our attorneys and in all probability move with much more alacrity than you are accustomed to experiencing in patent matters.

Larry Chambers in conversation with me has mentioned that you yourself have several patents from which you have not apparently derived any revenue, and it occurs to me as Managing Director of Glen's Patents and Holdings, Inc., that there might be some basis of getting together whereby G. P. H. could exploit and enforce your patents - and as enforcers G. P. H. is really grade A-1. Have you any thoughts along this line?

With very best wishes for the holidays and the anticipation of a prompt reply, I am

Cordially yours
MCMURDO SILVER CORPORATION

McMurdo Silver
MS:L

December 28, 1936

Mr. McMurdo Silver
McMurdo Silver Corp.
2900 South Michigan Ave.,
Chicago, Ill.

Dear Mac,

This will acknowledge yours of the 22nd. I have studied your patent very carefully. It is one that I should think would find some worth-while applications in our industry some time.

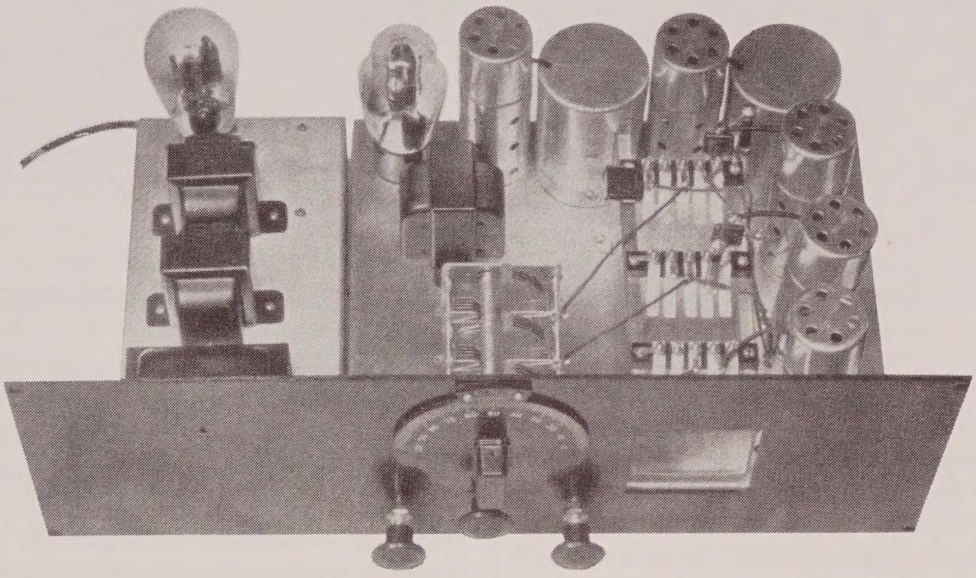
None of our present production receivers, however, in any way infringe the claims of your patent. We definitely do not, and never have, shifted position in inductors in order to change from general coverage to band spread. I am sure that if you will re-read the claims of your patent, and re-study any of our literature, or re-examine any of our receivers, you will see that this is a very clean-cut matter with no possibility of doubt. The set-up that we use is also very thoroughly and definitely covered with patents issued prior to your application.

I realize how difficult it is for anyone with a new patent to secure licensees in our industry, unless he has some prominent manufacturer to whom he can point as a licensee. For old time's sake, I would be willing to take a free license under your new patent if it would help you any in your negotiations with others. We might well get around the free part by making a fixed royalty of a dollar a year or something of the sort. At this time, however, I definitely have no intentions of changing the design of any of our receivers to incorporate the teachings of your patent, or for that matter, I am not even contemplating bringing out a new receiver that might do so.

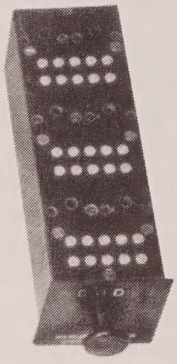
With best wishes for the New Year,

Cordially yours,

JM:KS



The McMurdo Silver "Ham Super" advertised in *QST* - covering 1.5-15 MHz in four bands, with bandspread on 160, 80, 40, and 20 m.



Dec. 1, 1936. McMURDO SILVER 2,062,379

RADIO RECEIVER

Filed Nov. 30, 1934 2 Sheets-Sheet 1

Fig. 1.

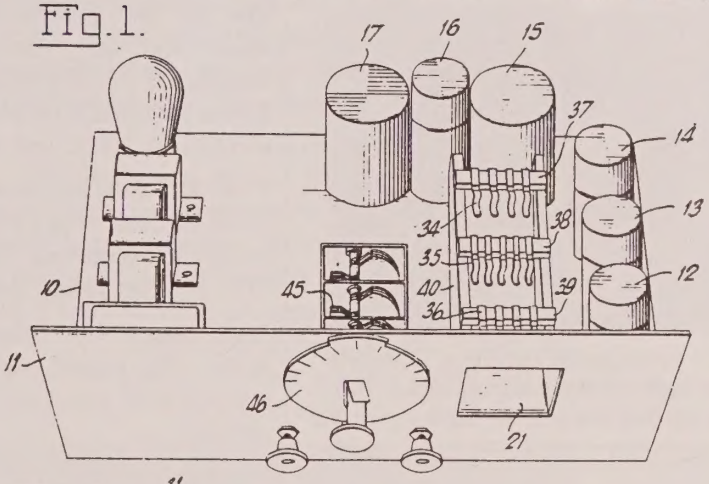


Fig. 2.

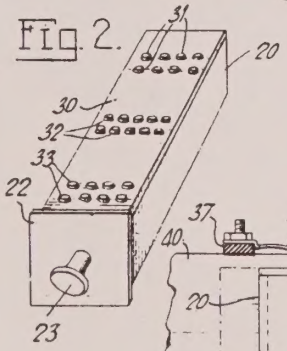
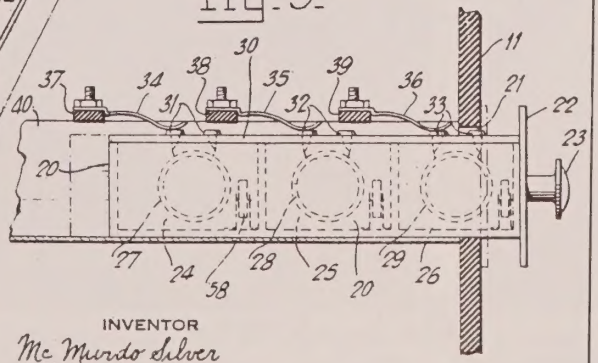


Fig. 3.



INVENTOR

Mc Murdo Silver

BY

Watson, Bristol, Johnson & Leavenworth

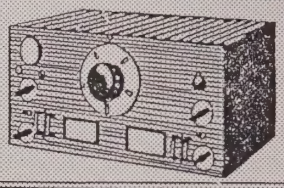
ATTORNEYS

QST, Oct. 1930). Furthermore, every claim in his patent specifically mentioned shifting the tuning range by positioning the drawer, which National did not do.

One puzzle here, is how McMurdo Silver got his patent at all. His application is dated November 30, 1934, well over a year after his *QST* ads, while patent law allowed only one year after publication or sale. Presumably, if the law was not violated, the publication had not been detailed enough, and there were no sales. But what about Postal, who advertised (and presumably sold) the same coils in July 1933, also well over a year before Silver's application?

In any event, whatever the legality, Silver's patent was commercially valueless by the time it issued.

THE COMMUNICATION RECEIVER



WRITTEN BY
WILLIAM B. FIZETTE, K3ZJW
RD 1, Box 55, Henryville, PA 18332
All correspondence requires SASE for reply.

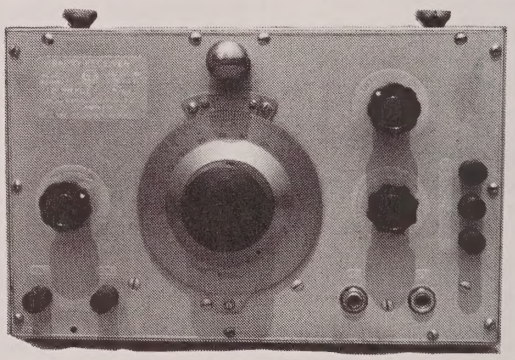
MARINE RADIO . . . THE RMCA MODEL AR-8504 SHIPBOARD RECEIVER

William B. Fizette, K3ZJW

Prior to May 20, 1937, the Communications Act of 1934 required U. S. passenger ships only to have a transmitter, receiver, and emergency power supply. On this date, Congress enacted Public Law 97, amending the Act to require, among other things, that all passenger ships be equipped with two complete transmitters and receivers, main and emergency, as well as emergency power.

The Radiomarine Corporation of America, a subsidiary of the RCA Manufacturing Co., designed and made several models of marine transmitters and receivers during the 1930s. The AR-8504 in this column is one of these. Future columns will detail other RMCA receivers.

The AR-8504 receiver is a small emergency vacuum-tube set designed for the marine communication band of 375-500 kHz. While intended as a back-up set for shipboard use, it could be used anywhere that its simple power needs could be met. The label states that the coverage is 350-515 kHz, but it actually tunes a much broader range, 300-900 kHz, reaching the lower end of the AM broadcast band. In fact, when I first fired up the little set and began receiving BC stations as high as 800 kHz, I was under the impression that the litz-wire coils were shorted by 55 years of accumulated moisture. Fortunately, this was not the case.

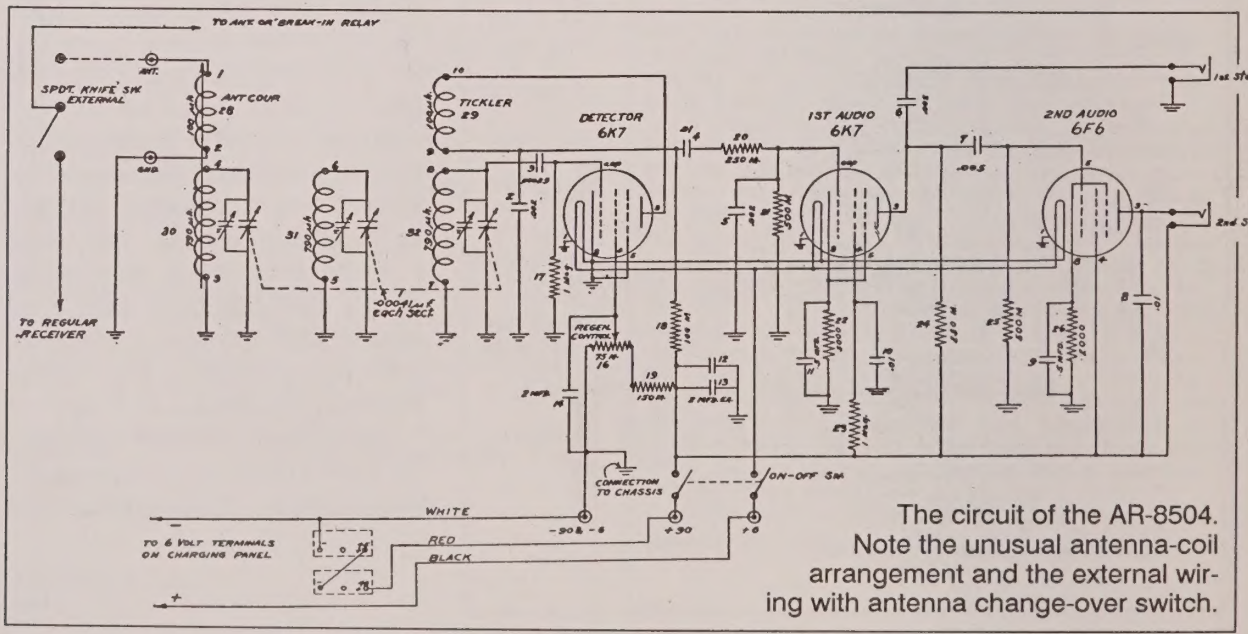


The AR-8504 emergency receiver. The protrusions on top are the cabinet locks; the round device above the dial is the lamp hood.

THE CIRCUIT

The design provides for reception of A1 (CW), A2 (modulated CW), and B (spark) signals. AM phone is not mentioned specifically.

The tubes are a 6K7 regenerative detector, 6K7 first audio, and 6F6 second audio. Two headphone outputs are available, the first at the first audio stage and the second directly off the 6F6 plate. Power required is modest, 6 VDC at 1.5 A and 90 VDC at 5 mA, but power could be conserved if necessary by removing the 6F6 and operating with the two lower-drain tubes. The power switch controls both the A and B circuits.



The circuit of the AR-8504. Note the unusual antenna-coil arrangement and the external wiring with antenna change-over switch.

An interesting design feature is the use of three ganged tuned circuits in a band-pass coupler arrangement. A closeup shot of the coils is among the photos. The adjustable mechanical coupling of the coils provides a crude means of volume control.

Regeneration control is by means of a 50K ohm pot varying the screen voltage of the detector. The latter is coupled to the first audio stage with a simple low-pass filter. The 6F6 output is directly through the headphones. The source information I have [1] emphasizes that it is important to use the correct polarity on the headphone cord to prevent demagnetization: with Trimm headphones the phone-plug tip should connect to the red tracer wire, and with WE phones the tip goes to the green tracer wire. Ignoring this, I plugged in a set of high-impedance headphones and got away with it.

PHYSICAL DESCRIPTION

The overall dimensions including knobs are 7" x 8-5/8" x 11". Weight is 11 pounds. The cabinet top is hinged for access to the tubes. The construction is mainly aluminum, the front panel embossed with a satin chromium ripple finish. All connections are to the front panel: antenna and ground, three power terminals, and two headphone jacks. The cabinet has no opening other than the top. Strangely, considering intended use in a wet, hostile environment, the set is not sealed against moisture other than having the coils wax-impregnated and operating with the lid closed. The cabinet is not gasketed.

EVALUATION

My inspection of this little receiver revealed mostly high-quality workmanship and materials, in a simple layout. However, making it work on the usual bench AC power supplies was another story. A and B supplies must be clean DC; no sloppy B-supply or AC heater source for *this* set. Once this hurdle was passed, the set worked nicely without any servicing. The tubes were RCA and checked very good. Commercial stations were received below the broadcast band, as well as a number of BC stations, although it was difficult to tune in the latter without having the interfering carrier. This seems to be in line with the circuit design.

The receiver was wired with No. 16 round bus covered with cambric sleeving, and uses the neat right-angle techniques of early radio. Unfortunately, fundamental construction technique was violated in that most of the connections were not physically secured before soldering; I found one of the ground connections to the coil strip broken away from the terminal where it had been simply pasted on with solder.

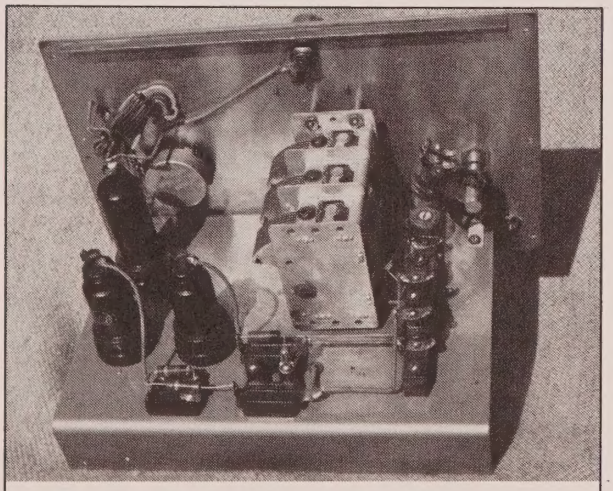
Most of the resistors were out of spec, high by at least 20%, but, having no other plans for this receiver, I elected to leave them alone. As an *unaltered* collectible it has more appeal. The capacitors are either oil-filled (Fast Mfg. Corp.) or mica. Note the National Type N tuning dial; the scale reads in a clockwise direction. It should actually be CCW in keeping with the original intent of having higher numbers read higher frequencies. (The picture in Sterling's book clearly shows this . . . in due course the correct dial will be substituted.)

A nice design touch is the small lamp over the tuning dial. In case the room lights failed, the hood could be removed to provide a dim emergency light.

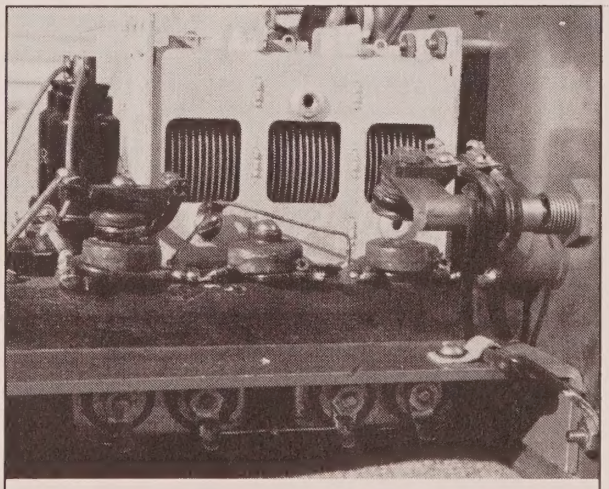
The set was to be fastened to the operating position and hard-wired to the battery and charging circuits. In case of failure of the main receiver, it was simply a matter of the operator throwing a knife switch to transfer the antenna circuit, plugging in the headphones, and turning the power on. It would appear that this simple little radio admirably served its purpose of backing-up the primary equipment of a civilian ship of the 1930s.

REFERENCE

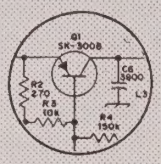
1. Sterling, George E., The Radio Manual, 3rd Ed., 1938, pp. 692-697.



The rear of the receiver. The RC network between the 6K7s is the low-pass coupling filter. The coils are mounted on an insulating strip to the right of the tuning capacitor.



A close-up of the coils. Clearly visible is the variable antenna coupling coil and the fixed detector feedback coil. The space between the coils is 3/4".



TRANSISTORLAND

EDITED BY
Henry B. Cohen ("Mister Transistor")
2459 Eighth St., Fort Lee, NJ 07024
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This quarter we'll take a good look at the most eagerly awaited book in the history of transistor-radio collecting. And I'll present a transistor collector's assessment of the 1993 Rochester Meet. That said, fasten your safety belts 'cause here we go!

COLLECTOR'S GUIDE TO TRANSISTOR RADIOS - IDENTIFICATION & VALUES

Authors: Marty and Sue Bunis, Collector Books, division of Schroeder Publishing Co., Inc., PO Box 3009, Paducah, KY 42002-3009, soft cover, $15.95 + $2.00 P&H, copyright 1994.

The big news in Transistorland this past quarter was the October release of the Collector's Guide to Transistor Radios (CGTTR) by Marty and Sue Bunis. This was thought to be "the" book that all radio collectors could reference - the "bible" of transistor-radio collecting. And, judging by the success of the Bunises' earlier books, it might have been. But aside from Beth Summers' strikingly beautiful cover design, this volume offers little in its 254 pages.

On receiving the book, I quickly thumbed through its numerous, colorfully illustrated pages, as any reader might do. Imagine my surprise at discovering it contains a virtual rogue's gallery of cheap, post-1963, virtually worthless, Pacific Rim sets. It's a travesty to devote page after page and numerous color illustrations to products from such 'luminary' companies as Casey, Hy-lite, Jetstream, Juliette, etc. It is equally appalling to find 13 heavily illustrated pages devoted to General Electric products. With one or two exceptions, no transistor radio made by GE is "collectible." Zenith, which made many collectible sets, gets 10 pages, which is good. However, arch-rival RCA receives almost as much space, which is bad. Other than its first pocket set, the 7-BT-9J, no RCA transistor radio is especially noteworthy or collectible. And these are just some of the problems with this book. It does not appear to serve any particular collecting community or interest. The authors' selection of illustrations was seemingly based on available photos and not on what sets were important or critical to display. This category should minimally include the first transistor product of each major maker. For example, Magnavox, a company noteworthy for its lack of collectible radios, launched its transistor business with the hand-wired AM-2 which *is* highly collectible, as is the look-alike AM-5 PC version. Try to find a photo of either in this book. Actually, you come close when you locate the shot of a Sentinel 1E500, but a reader should not have to be an expert to use a book. To be genuinely valuable, color photographs should appear of virtually every radio illustrated in the first five to ten Sams' Transistor Service Manuals. These are the seminal, and consequently most collectible and historically important, transistor radios.

You know there's going to be trouble when a book begins with a disclaimer. Let me quote from the first paragraph in the CGTTR: "The current values . . . only as a guide . . . not intended to set prices." Yet just two pages later, the authors state "One of our main reasons for writing this book is to establish a firm groundwork for transistor radio pricing . . ." Not only is there an identity crisis, some might construe this to be an attempt at price fixing. This was not the case in the Bunises' first books, although each begins with a similar disclaimer.

Since the authors failed to write introductions to the principal manufacturers or any other germane editorial content, what remains are hundreds of descriptions of radios and prices classified by make and model number. Nowhere do we really learn how the prices were derived. Did they spring from the head of Zeus? No, wait . . . there is an "Explanation of Pricing Section." But there's no pricing section. Instead, the prices are contained in each description. And, according to the explanation, the pricing comes from several sources including classified ads, radio meets, and most notably a panel of "veteran" transistor collectors. Well, I want to know who comprised that panel! A trip through the guide will reveal that far too many sets fall in the under-$20 price range, which means that they are basically worthless. These are the radios that are frequently seen in the $2 "distress" box at a radio meet or sold by the pound and are virtually never advertised. Therefore the prices shown, in my opinion, are geared to giving worth to non-collectible junk sets, and devaluing those sets that are truly collectible. Doubt me? Then try to buy a green TR-1 in VG/excellent condition from *anybody*, especially an established collector, for $600.

At the least, a "Collector's Guide" should offer some rudimentary guidance. This one does not. It would have been relatively easy for knowledgeable authors to provide an introduction to all the major players. Even lacking this knowledge, why not reveal that the TR-1 is the most collectible transistor radio ever made? Why not talk about the enormous popularity of Emerson's 888 series of products or the superb and influential Zenith Royal 500 sets?

Where is the global information that most collectors shun leather cases, favoring plastic-cased radios, and covet most hand-wired sets? What about the "interest factor" of plug-in (very early) transistors, or the role of Civil Defense dial marks as a hint of pre-'63 vintage? Well it's certainly not available in this book.

I wrote in an earlier column (February, 1993 *OTB*) about why I disdain price guides, but also stated that "if, however, they are properly researched, the volume should be valuable for identifying and dating radios." Unfortunately, errors of fact and editorial sloppiness abound. On page 116 a Mantola M4D (a highly collectible radio) is positioned as similar to a Regency TR-1. It's not, but is a repackaged Regency TR-*4*. This is no small mistake and could be extremely costly. On page 220 the highly collectible Toshiba 5TR-193/5TR-194 "Lace" (as it's commonly known) reverts to a model TR-193 "The Reflex." I'll give the authors some leeway on this one, but only because Toshiba refers to the set in its instruction sheet as a reflex design. However, there is really no excuse for errors of fact in a volume that is likely to become the sourcebook of a hobby interest. On page 165 the authors state that the "1958" 7-BT-9J was RCA's first transistor radio. That's true, except that it was made three years earlier, as was the 7-BT-10K shown in the next paragraph. What gives? On page 119-120 the Mitchells (TR-1 variants) are repeatedly described as "horizontal" sets although the illustration clearly shows them to be vertical. And the Million pictured above at $45 emerges anew on page 169 in Realistic trim as the Hi-Fiver for $40. Whoops! On page 244 a Zenith Royal 400 is illustrated sans its lower trim panel and on page 245 prices are listed for the printed-circuit Royal 500 in all colors *but* the original black and maroon. I cite other blunders I've found, but why bother? It suffices that any reader who religiously uses this book would be well advised to verify any critical information elsewhere.

As you may infer, writing a source book takes incredible attention to detail. Clearly this is a lesson lost on the authors of the CGTTR.

Presenting arguments over the prices stated in the book serves little purpose because costs are typically variable. The Bunises would have been far wiser to present a *range* of prices, as Robert Breed did in his thoughtful volume on novelty transistor radios. Mitigating circumstances should have been clearly addressed and not barely mentioned in the fine print. Specifically, a 'mint-in-box' set complete with papers can be worth a small fortune if the radio is an extremely rare model. In this case color is often far less important than overall condition. And working condition is often critical to new collectors. Pricing among long-time collectors is a different animal, as they apply a dollar value to their sets primarily for the purpose of trading. And sales to collectors who want to own the most difficult-to-obtain sets in factory-new condition are different from sales to and from antiques dealers and tube-radio collectors.

If you're wondering if there's anything I liked about the book. the answer is "no." Had the volume been targeted to antiques dealers I would have expected low prices across the board because they buy only to sell. Had the book been written for radio collectors, I would have anticipated generally higher prices because collectors usually add something to a buy-sell transaction that generalized dealers don't. Perhaps it lies in their wealth of knowledge, or perhaps they have restored their sets to better physical or working condition. Due to the errors cited, the inclusion of too many (about 150) meaningless photographs, an explicit lack of cogent editorial material, and enigmatic pricing, I cannot recommend this book to anyone. If you need photos of collectible sets for identification purposes, you will be best served by obtaining TSM Volumes 1 through 5.

THE ROCHESTER MEET

Lack of space in the previous issue prevented me from commenting on the annual Rochester AWA Conference from a transistor collector's point of view. Having attended this meet for the past two years (yeah, I'm still a newcomer), I have at least a minimal perspective on the event, so here 'tis.

Overall, plastic radios do not fare well at Rochester, whether encased in Catalin, polystyrene or Nylon. Only brown Bakelite is truly appreciated. But the genuine distaste for Catalins does not seem to carry over as strongly to transistor sets. While it's true that many of the old-time radio buffs could care less about the new kids in town, a large number showed a real interest as these sets continue to penetrate the flea market. And most recognize that the TR-1 is a serious collectible even if it is, heaven forfend, *transistorized*.

That said, a real lack of pricing knowledge among most attenders begs to be addressed. There were an awful lot of junk sets carrying fairly high prices ($20-75), displayed by dealers at the flea market who had no idea of what they had or what to charge. And for those few sets that are known collectibles, the prices were generally high for the relatively poor quality offered. Bargains, I dare say, did not abound.

In the auction a cracked, black TR-1 went for $210. But what the buyer might not have known was that it contained a photocopied label. This explains why the more knowledgeable buyers stayed out of the bidding. The radio was basically a parts set that should have sold in the $100-150 range at most. Another black TR-1 was sold in the flea market for $300. A shame, because this too was a parts set, complete with numerous cracks, paint flaws and a missing piece of the integral battery holder on a cracked PC board.

(Continued on p. 34)

EXTRAVAGANZA '93

Larry Babcock
8095 Centre Ln., E. Amherst, NY 14051

While you consider whether Elgin or Rochester is the bigger antique-radio meet, keep a close watch on "Extravaganza," held in Lansing, Michigan. In 1993, July 16-18 was the eighth Michigan Antique Radio Club - AWA convention. It is growing very fast.

This young club has a lot of novel ideas. For example, they put a 40' X 40' registration and hospitality tent right in the middle of the flea market with free refreshments for registrants. As with Rochester, the hotel cooked lunches in the flea-market area. You could get a hot dog there, get a drink from MARC, and sit under the "big top" and discuss purchases with other collectors while lunching. MARC used a private paved, lighted parking lot next to the hotel. With 450 available spaces, it has plenty of room for expansion but even in 1993 it was well over half full.

As a Federal collector, I saw a Junior crystal set, a 58, two 59s, a 102, and the first "Milan" I have ever seen - probably the fanciest Federal ever made. In beautiful condition, it sold for almost $2,000! This cutie, about 5-½ feet tall, had a loop antenna in one of the doors and a built-in 7-½ foot horn speaker.

One seller wanted to trade his nice Grebe CR-12 for a Catalin radio. I can never understand why a modern bright-colored plastic set with cheap features like a line-cord resistor and AC-DC design is more desirable than one with real historical value.

I saw only one AK breadboard offered, a 10C, for $1000. Can they finally be getting scarce? One fellow drove up with a nice AK 9 variometer breadboard. He never got into the lot - someone asked the price and was told "$400." It was purchased instantly and then the seller reminded "Don't forget the AK speaker that goes with it"!

One seller had five Scotts in beautiful condition. Another displayed 29 Catalins, 27 the next day. There were lots of Catalins and tons of novelty transistor sets. Except for the Federals I didn't see many historic sets, but there was a good wood shipping crate for a Radiola AR-812 (second-harmonic superhet) offered for $60. I found another Motorola A1 miniature maroon portable, of special interest to me because I carried one through Europe as a soldier in WW II.

Another great idea at MARC is to replace the usual banquet with a social hour and program. Two things made it very popular. It was "come as you are" and *free*! The banquet hall was packed. On entering, one came first to an excellent 100-foot-long display of the chronology of radio, including sets, signs, newspapers, and programs, arranged in five exhibits covering 1935 - 1965. The ladies also liked this. There was an interesting, nostalgic talk by radio announcer-engineer Dick Estell, followed by the program "Fine Tuning" written by Bruce Tanner and narrated by Mr. Estell. It included the Abbott and Costello routine, "Who's on First" by Jacob Knoll and Brad Scriber. I enjoyed their rendition more than the original! Then there were top-notch male and female barbershop quartets singing popular songs and advertising jingles from the golden days of radio. It was "my kind of" show, featuring radio as remembered from youth. Everyone was well entertained.

MARC also had good ideas for the auction. All bidding started at $20, wasting no time on cheap stuff. If you had three low-value radios, you combined them into one lot. This helped a great deal. They also sold big items such as consoles (even Scotts), Rider's and Sams manuals, etc., easily: they simply put the item on a dolly and rolled it in front of the audience.

Another novelty was to coordinate the numbering of lots from each seller. My bidder card was "45." My first lot was 45-01 and so on. All the -01 lots were sold first, the -02 lots next, and so on. Each seller was thus guaranteed that his first few lots would be sold. This year everything went but some years they had made it to only -05 before the cutoff time. Other clubs might follow these ideas.

The auction, 240 lots, lasted four hours; total sales, $19,500. About 15% of the lots were not sold because they did failed the $20 minimum bid or the seller's reserve ($2500 was bid for a nice Sparton Bluebird, vs. a reserve of $3500).

The "star of the show" was a small green Detrola Pee Wee table radio with black trim and knobs, $1000 even. Close behind was an AK 10C breadboard in fair condition with "good" transformer and tags, at $950. Next highest was an early Scott Shield Grid 9 in VGC, less cabinet, for $625. Surprisingly a Scott 800B, VGC and playing, brought only $300.

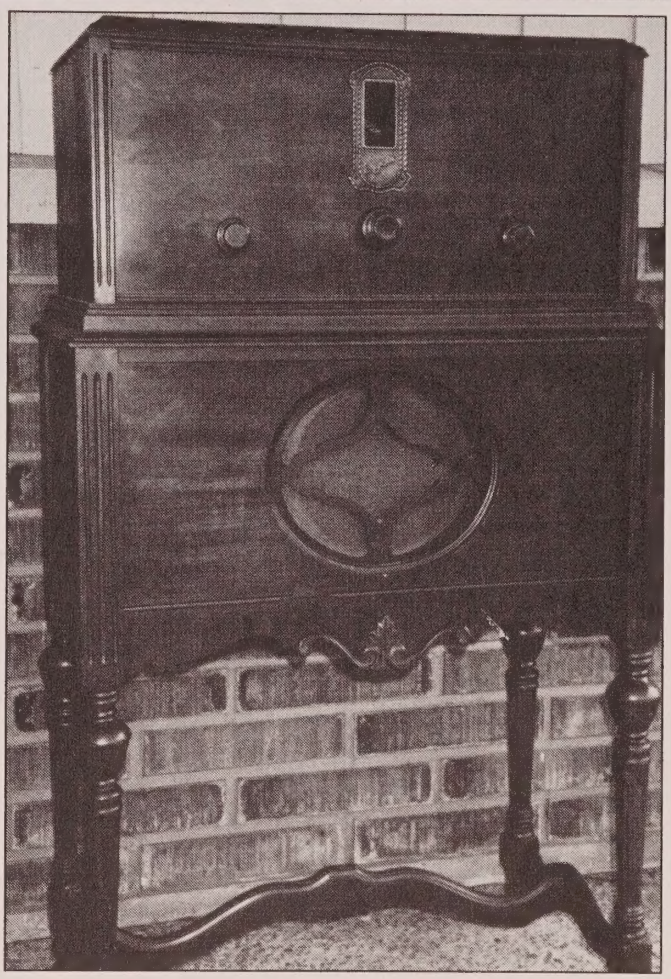
In the Catalin department a Fada 652, maroon and yellow, sold for $495 and a working deep-red RCA 668 for $400. A pair of beautiful bright-red Sparton radio posters, each about 7' high by 3-½' wide, went for $440 and finally an Adventurer Tower cone speaker (the one with the clipper ship) brought an amazing $425!

The contest filled a big room with some beautiful equipment. There were 12 categories plus three special awards.

The new, larger location worked out very well. Exactly 500 name tags were issued to 288 families from 25 states and three countries. If you weren't there you missed a good meet.

REVIVING A MAJESTIC MODEL 71

Harry Stavert
7231 68th Ave. NE, Marysville, WA 98270-7742



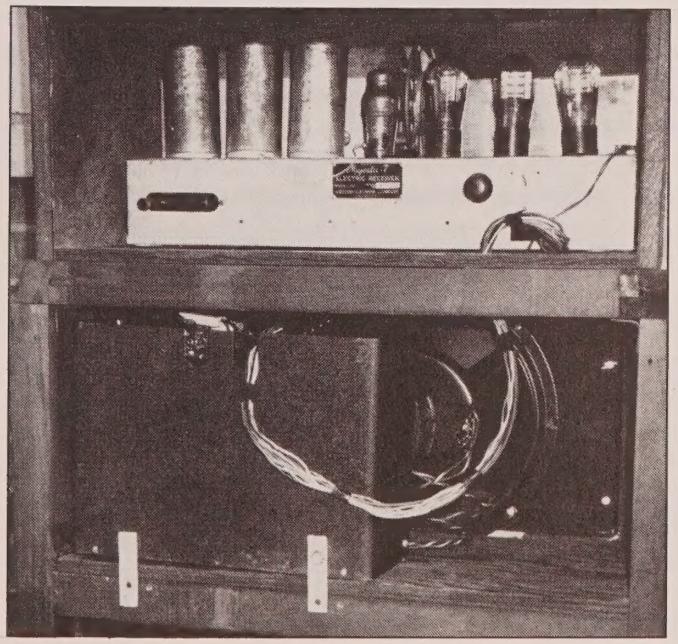
An old friend of mine who had been in the radio-TV service business for the last 60 years recently passed away. In a dusty corner of his service shop, sitting silently for past decades, was a Majestic Model 71 console. He had promised his daughter that some day he would make it work for her. Unfortunately, he didn't quite "get to it" and, with his passing, she asked me if I could make it go.

My first look at the radio didn't result in an eager desire to work on it. Besides everything being covered with dust, the field-coil-type speaker was missing, half the tubes including the ballast had disappeared, and the dial cable was broken.

After pulling the chassis, I discovered that the external power supply was a disaster! The power transformer was burned out and the filters shorted (explaining the blown transformer). The encouraging item was that Majestic had used a separate filament transformer which was still OK. Imagine trying to find a replacement with four windings - two 1.5-volt, one 2.5, and one 5!

It was obvious that the power supply could not be returned to the original configuration. A decision was made to do what was necessary to make the radio play. Improvising a plate transformer to replace the one burned out was fairly easy.

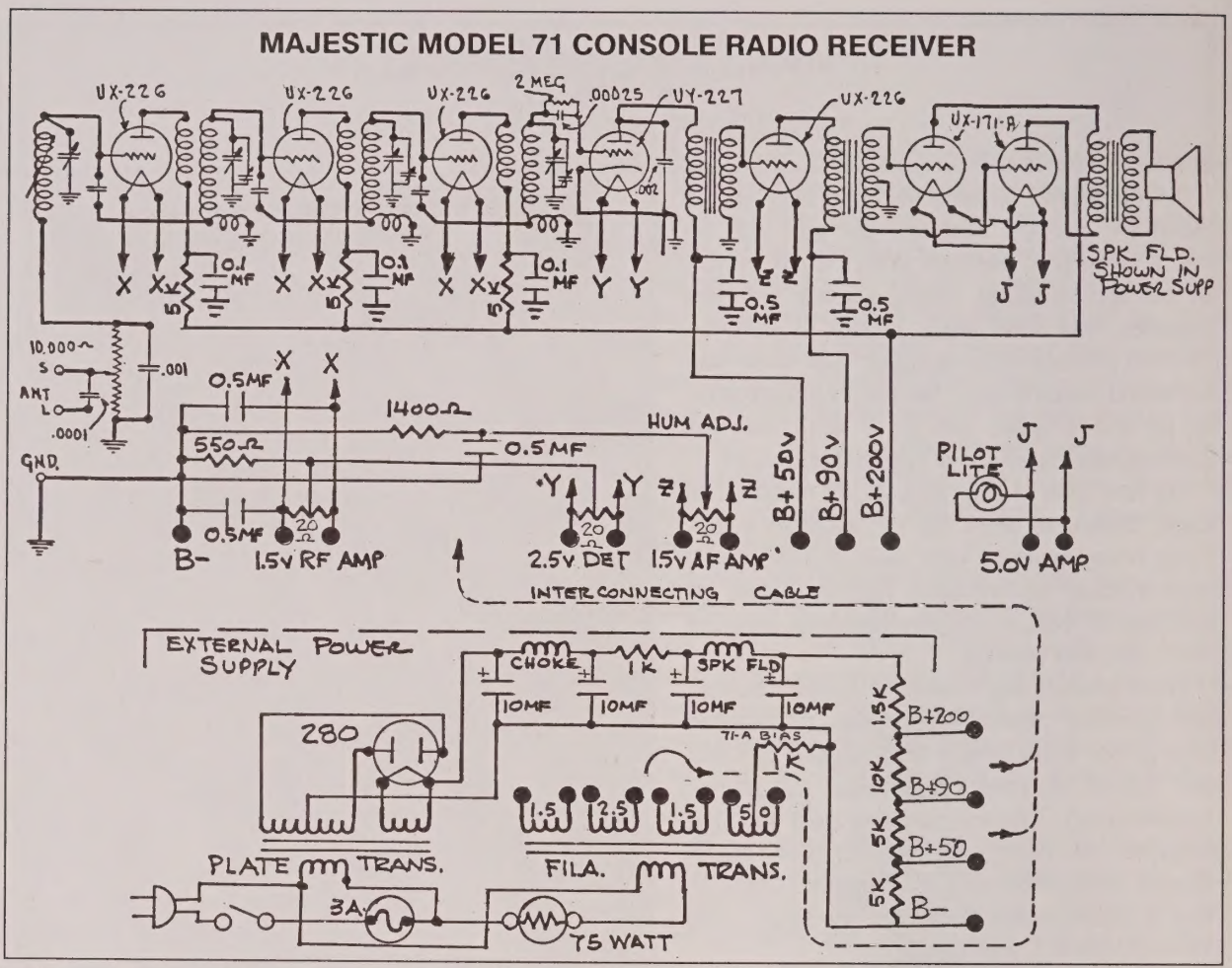
The filament transformer was originally connected through the ballast resistor. Present-day AC-line fluctuations are insignificant compared to those found in the Twenties, therefore the ballast isn't really required. However, it was necessary to duplicate the 30-volt drop across the ballast. It was found that a 75-watt light bulb provided this drop nicely when used in place of the ballast.



The next unpleasant surprises were in the radio chassis. Rubber-covered hook-up wire had its insulation rotting off, and had to be replaced in several locations. All the 0.5-μF bypass capacitors had excessive electrical leakage and had to be changed. The pre-amp audio transformer was open.

Rider's Volume 1 shows the Model 71 under "Grigsby-Grunow" as the model 70B, with the 7P6 external power supply. As is often the case, the set wiring doesn't quite follow the diagram. One example is 90 volts B+ shown in Rider's for the RF stages. The set was wired to supply them with 200 volts. The diagram also shows the same 90-volt wire strangely continuing to the field-coil terminals on the radio chassis. Fortunately that was not the case in the set wiring.

The diagram shown herein is what I finally ended up with. The upper part is identical to



Rider's. The power-supply filters and voltage dividers are different because the new transformer had a higher secondary voltage and required a little juggling of resistor values. Also, decoupling resistors and capacitors have been added to each RF-stage plate supply. This was done for two reasons: to help eliminate squeals resulting from possible impedance coupling via the power supply, and to reduce the plate voltage to 180 maximum.

The final reward was in the performance of the radio. In my opinion, this set is probably the best-running TRF I have ever heard. It has good sensitivity across the dial, not unlike a well designed superhet. There was no sign of any feedback or squeal. One remarkable discovery was that the neutralization in the RF stages is still in adjustment. I have no reason to believe that anyone has touched it since it left the factory in 1929. It has held perfect alignment for this whole period!

Webster defines the work "majestic" as inspiring awe and reverence. I think that describes this radio. It is truly majestic!

(Continued from p. 30)

While I don't begrudge the sellers, I was sorry to see people waste money on low-end pieces.

The only realistic way to determine the correct pricing for all of these sets, both low- and high-end, is to read classified radio ads and then phone some of the sellers. You might even call known collectors to find what they'll sell and at what price. If you take this approach, I predict an elucidating experience. Also ensure that the radios you buy are virtually flawless. At the high end some problems are acceptable but they depreciate the value of the set enormously. That's why the cracked TR-1s were no bargains. A "fine" example out of the box will still appear, albeit rarely, in the $200-300 price range. Even if it costs more, it's worth it because you can always sell it for at least what you paid. The Rochester TR-1s will take extensive and costly restoration before they can be sold at market price, leaving the buyers with an investment of close to $500, a price that is realistic for a fine black TR-1 out of the box, sans papers.

The bottom line is that Rochester has a long way to go before it becomes a mecca for transistor collectors, although improving slowly. We'll know we've made it when a TR-1 or TR-63 wins "best in show" or, more important, adorns the cover of this fine worldwide publication.*

If you have comments or questions, you can reach me at (201) 585-0030, fax (201) 585-1659, or write to the address above.

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* Make it happen! Send in color photos of suitable quality, or, better yet, color transparencies. - Ed.

EARLY EQUIPMENT PROFILE

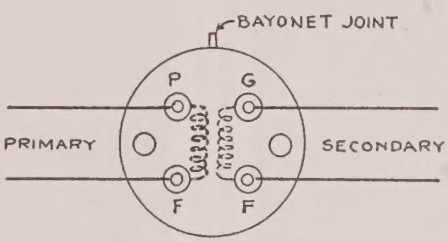
EDITED BY
LAUREN PECKHAM
Ormiston Road, Breesport, N.Y. 14816
All correspondence requires SASE for reply

THE MUSEUM-ANNEX "SUPER RECEIVER"

The wonderful assortment of early receivers, etc., stored in the AWA annex building often provides surprises. Hundreds of items line shelves from floor to ceiling, many awaiting restoration and eventual display at the museum in Bloomfield.

From these, Curator Bruce Kelley asked me to research a strange-looking "not in Rider's" set with (apparently) seven tubes. He was willing to bet it would keep me busy for several months! It was made by the Super Antenna Company (Quincy, Illinois) as the Super Receiver, Type R2-A3. The circuit is similar to those of other radios of the early 1920s, designed to operate with a loop antenna - the loop is tuned, but the following RF stages are not.

An unusual feature is the use of plug-in RF coils, arranged to fit a UV-type tube socket, but unmarked as to frequency coverage. The Amrad Company used a similar idea with their "Radiformer" coils. However, Amrad issued a warning in their Bulletin No. 348: due to "objectionable capacity and electro-magnetic effect" introduced by a socket with a metal shell *[read: shorted turn]*, only their fiber-type sockets should be used. The Super Antenna Company got around this problem by mounting the actual coils above the metal portion of the socket. The portion fitting into the shell was in the form of a simple wood piece, lathe-turned to the correct diameter.



From Amrad catalog, ca. 1922

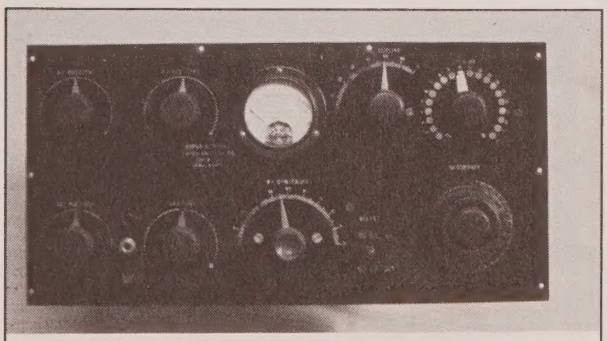
My first efforts at tracing the circuit made little sense until I realized that some of the RF coils and tubes had been switched. More work revealed an *extra* socket with no wiring to its terminals. So the set really used six tubes, with the spare socket possibly to be used for storage of an extra coil or tube.

If a long-wire antenna was available, the Super Receiver included a double-throw switch which added a "front end" section. This consisted of a coil with tapped primary and a rotating secondary for adjustment of coupling. This feature is a "must," as selectivity is not something that the manufacturer built into this (nominally nonregenerative) set!

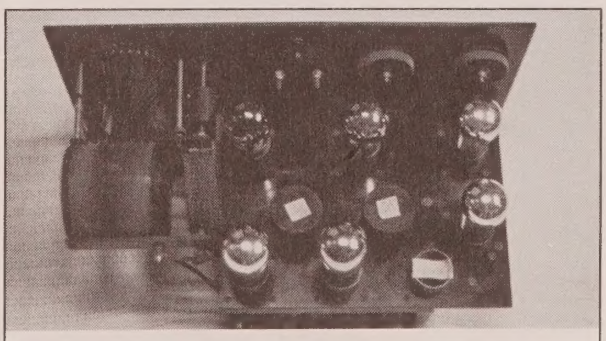
Other than the usual filament rheostats, tuning capacitor and coupling adjustment, a "stabilizer" control was included. Its real purpose was adjustment of grid bias for the two RF stages, driving the grids slightly positive to reduce the gain. Manipulation was tricky, as just about the time good gain is obtained, the set breaks into oscillation.

The panel-mounted meter is switchable with a telephone-type lever key, allowing for either the RF or the detector filament voltages to be monitored. Output connections are provided for each of the three transformer-coupled audio stages. Firing the set up, I found that the last or third stage was anything but necessary. As expected, even with the coupling as loose as possible, local stations were difficult to separate. However, this receiver was made in the days before there were several stations on the air in every city.

Finally, one has to wonder if the owner of this set figured out what the fancy-sounding model designation was all about: R2-A3, *two* RF and *three* audio stages; guess they forgot the detector! This model was offered between 1923 and 1925 at the impressive price of $210.



Up front: plenty of controls to tweak.



At rear: plug-in coils in the center.

ROCHESTER REPRISE

Photos: Richard Ransley, Wm. Stokes

At the gate to Paradise (?): A staffer from the Marriott helps Ed Gable with the flea market.

Novel marketing approach: use a decomissioned ambulance, and bring your own K-9 Corps.

Brightly colored plastics in the sunlight.

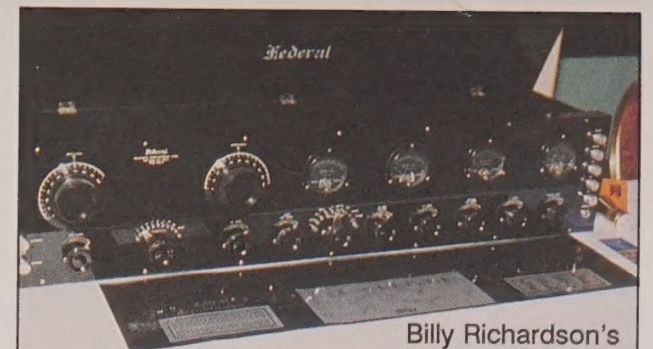
A couple of tasty AK products in the flea market.

Tony Flanagan's wares, and portable New Jersey Antique Radio Club recruiting station.

Joyce Peckham (top right) in the Ladies' Lunch.

Floyd Jury's exhibit of WW I artillery-spotter's radios: the BC-14A receiver, JN-4 aircraft, BC-15A transmitter, and accessories.

Floyd Jury receives (another) Display Award from Bruce Roloson.



Billy Richardson's charming "Federal 109S" superhet on exhibit.

Precious tubes awaiting the auction: (left box) a couple of Farads, (middle) two brass-based GE transmitting types, (right box, top to bottom) a CG-886 triode, an AEG K-1 repeater tube, a Weagant Valve, and an ERECT Valve.

Sibley, Kelley, Peckham, and Wooters hustle estate material out of storage for the communications-gear catalog auction.

A small part of the communications equipment for the catalog auction - *not* showing the DD-1!

GERMAN WW II MAGNETRONS - THE LMS-SERIES

Jerry Vanicek
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INTRODUCTION

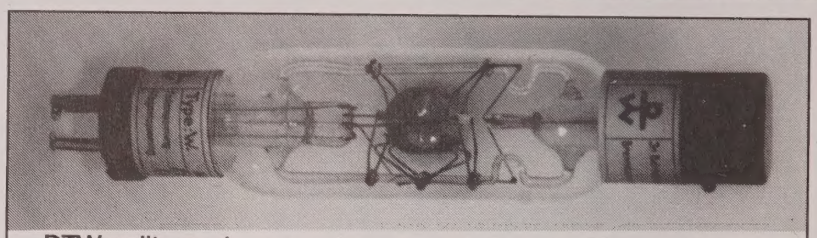
Radar development during WW II was considered top-secret by both the Allied and the Axis powers. Today, radar historians still search for answers to complete the picture of American tube development; there are still "VT" type-numbers which remain a mystery. German wartime industry was almost completely destroyed by the Allied bombers. Most of the records and tube archives were demolished. After the war, a number of German scientists were recruited by the occupying countries. The subsequent isolation caused by the Cold War and the priority of rebuilding did not contribute to the process of historical documentation. The task of completely reassembling this phase of radar history is enormous.

THE MULTICAVITY MAGNETRON

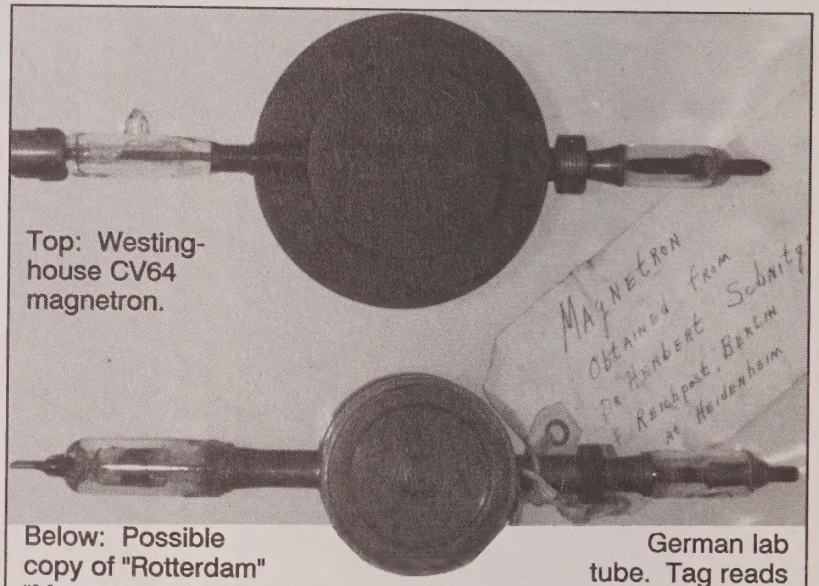
The magnetron was a well-known device. Though developed at General Electric into the post-WW I UV-212 [1], the early magnetron was little used. Further evolution of the magnetron would await the interest in high-frequency research of the late '20s. German scientists also showed interest in this device; by 1929 the German company DTW (Deutsche Telefonwerke) had produced at least two types of split-anode magnetron [2].

The British are generally credited with the invention of the multicavity magnetron. The Russians may have independently discovered this device but did not use it in a pulsed mode of operation [3].

The multicavity magnetron made possible the development of high-power radar operating at wavelengths below 10 cm. The secret of the multicavity magnetron was short-lived: "An RAF Stirling bomber equipped with the 'H2S' navigation/bombing radar

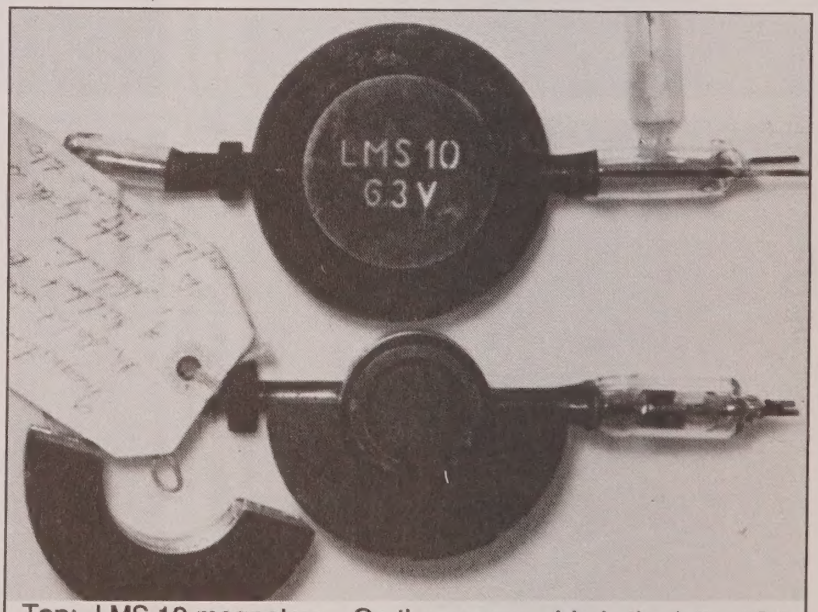


DTW split-anode magnetron. Anodes are in ( ) formation as seen here, surrounding a horizontal filament. The intricate glasswork is typical of early German tubes. *Photo: Udo Radtke.*



Top: Westinghouse CV64 magnetron.

Below: Possible copy of "Rotterdam" "Magnetron obtained from Reich[s]post, Berlin now at Heidenheim." German lab tube. Tag reads Dr. Herbert Schnitger of *Photo: Jerry Vanicek*



Top: LMS 10 magnetron. On the reverse side is the letter "G." Below: LMS X with half of cooling fins removed. Tag reads "Magnetron obtained from Dr. Herbert Schnitger of Reich[s]-post, Berlin now at Heidenheim. This is a copy by the Germans of a captured American tube." *Photo: Jerry Vanicek*

crashed in the Netherlands in early 1943. From it German technical-intelligence specialists extracted the mangled radar and its CV64 magnetron" [4]. A CV64 and what may be one of the first German laboratory copies of the "Rotterdam" tube are shown in one of the photos. Because of the intense wartime needs for such equipment, an almost identical copy of the captured radar tube became Germany's first commercial multicavity magnetron, the LMS 10 (see photo). Like the captured tube, the LMS 10 has eight cavities [5]. In both tubes output is connected to a concentric (coaxial) line. There is a piece of conflicting information regarding the type of tube used in the H2S. Gierlach [7] compares the LMS 10 to the CV76. This statement is contrary to both Sibley [4] and SIGESO #56 [5].

Research continued in laboratories throughout Germany. In 1943 the research organization

TUBE DATA

(Unless otherwise stated, information is adapted from SIGESO #56)

LMS 10: Germany's first commercial multicavity magnetron; an almost direct copy of the "Rotterdam" tube. This tube is designed for pulse operation in the 9.1-cm region and has an output of 15 kW. The main maker was Telefunken; some tubes were made by Lorenz [11].

LMS 10a: A version of the LMS 10 to operate in the 8.7-cm range, made by Telefunken.

LMS 11: No other information available [12].

LMS 12: This tube has 18 cavities and is designed for pulse operation in the 3.25-cm range. The output is 10 kW. Manufacturer was Telefunken.

LMS 12a: A variation of the LMS 12 to operate at a slightly longer wavelength (3.55 cm). This tube never went past the developmental stage; prototypes were made by Telefunken.

LMS 13*: For use in a rangefinder for guns and rockets on day fighters. Tube has 18 segments; operates at 1.65 cm with a 5-kW pulsed output. Made by Telefunken. Lab work was completed. Production was expected, March 1945.

LMS 14: Construction and use sim. to LMS 13. Operates in 1.1-cm range with 2 kW pulsed output. Expected to be in production by Feb. 1945.

LMS 15: Similar in construction to LMS 12. Output is 0.5 kW pulse at 1.7 cm. Made by Telefunken; expected production was June 1945.

LMS 16: A magnetron tunable over a 40-MHz range. This tube had 18 segments, with pulsed output of 50-100 kW. Expected production was May 1945 but lab development was never begun.

LMS 20: The first metal-ceramic magnetron. This tunable water- or oil-cooled tube had eight slots and operated at 9.15 cm ± 0.4 cm. It was used in a pulsed mode for jamming. Telefunken made 20 units. LMS 20 was replaced by LD 9.

LMS 22: An 18-slot tunable magnetron with 10-kW pulsed output, to operate at 3.21 cm ±0.1 cm. It was in the developmental stage by Oct. 1944. The Reichsministry tube chart listed it as metal-ceramic but this was denied by Dr. Steimel of Telefunken.

LMS 30: This was to be an eight-slot tunable pulsed magnetron with 0.6-kW output at 9.15 cm ±0.4 cm. The Reichsministry tube chart listed it as metal-ceramic. Telefunken never built this tube, as it was replaced by the LD 9.

LMS 32: This tunable water-cooled unit, designed by Telefunken, had a 0.6-kW output at 3.2 cm ±0.05 cm (i. e., a range of ±40 MHz). It had a "wagon wheel" rather than the usual cylindrical cavity structure. Two were made by Siemens. It was designed to jam the "Meddo"@ equipment.

LMS 33: This Telefunken-designed tube was to be used for jamming, as the Germans thought the Allied forces had radar operating in the 1.25-2.4 cm range. It never reached the developmental stage.

LMS 86: This tube, designed by Telefunken, was to be used to guide the "Max" flak rocket. The rocket's explosive charge would be triggered by a proximity fuse. The magnetron's slots were of the "wagon wheel" design. It was to operate at 3.8 cm, with a CW output of 1.5-3 watts. Two were built by the Blaupunkt company. Mass production was planned for Feb. 1945.

LMS 87: This tube was to be used with the V2 rocket. The wavelength range was to be 4.5-5.1 cm, with a CW output projected to be 3.6 watts. The manufacturer was to be Telefunken.

LMS 100: These are 12-cavity pulsed units with 100-kW output at 9.1 cm. Telefunken made 10.

LMS 101: This 18-slot tube operated at 9.1 cm with a pulsed output of 1000 kW. Only four were made, one by Telefunken and three by Siemens.

LMS X: This was a copy of the "Rotterdam" tube scaled down for operation at 3.15 cm. It was pulsed, with a 5-kW output. Lab work was completed; Telefunken planned to make 10 a month.

LMS Y: The American 725A was copied. Lab work was finished, and Telefunken planned to make this tube.

LMS Z: This was a 3.25-cm pulsed tube with output of 10 kw.

LMS Za: A version of the LMS Z to operate in the 3.5-3.6 cm range.

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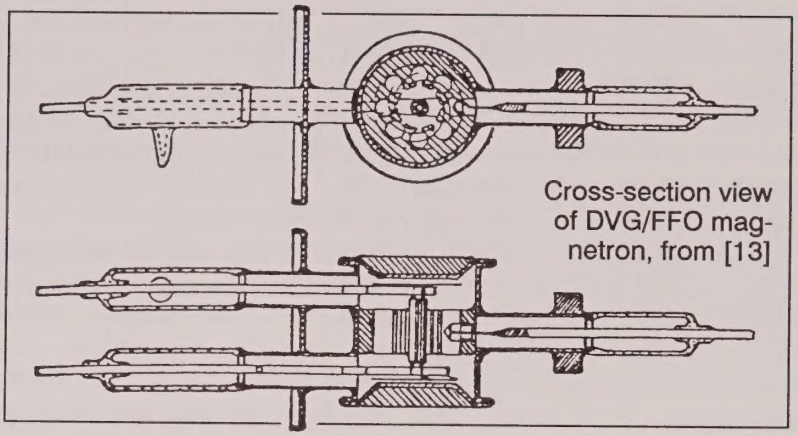
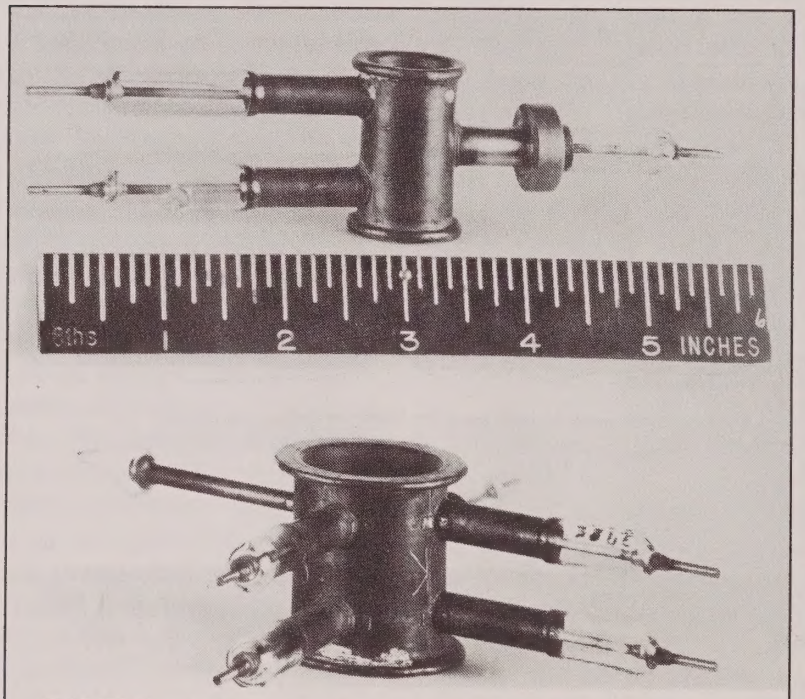
* The original report lists "LMS 12A" twice. The second listing is assumed to be the LMS 13.

@ We've been unable to find what this term means. Reader inputs requested! - Ed.



Cross-section view of DVG/FFO magnetron, from [13]



DVG/FFO magnetrons (1955 U. S. Navy photo from Fetsch Collection). On the upper tube, the two leads at left are the filament connections; the coaxial output line is at the right. As with all early designs, magnets are external; not shown.

DVG/FFO*, using this basic design, produced magnetrons capable of operating at wavelengths as short as 1.75 cm [6]. Prior to the German discovery, the British had shared the secrets of the magnetron with the U. S. An intriguing possibility is raised by a study of the photos. The tag on the LMS X, a 3-cm version of the LMS 10, states "This is a copy by the Germans of a captured American tube." The reverse side of the possible lab copy has a similar written statement. The Westinghouse CV64 is marked MADE IN U. S. A. Therefore, there is the possibility that the captured tube which gave away the secret of Allied radar was actually made in America.

By war's end there were a number of tubes in the LMS series. Some were copies of Allied tubes, others were of German design for specific uses. Most of the second-generation tubes never reached production. *All* examples are rare.

THE FATE OF SOME SURVIVING MAGNETRONS

In 1946 the American military held a conference at Wright Field, the Air Force base near Dayton, Ohio. The subject was Axis high-frequency tube development. All branches exhibited their samples of captured tubes [8]. Only a few of these have survived. Part of the Signal Corps collection is still at Fort Monmouth. The Fetsch Collection contains a number of tubes from the Naval Research Lab.

Possibly the greatest quantity of these tubes was at Wright Field. There were two depositories. One of these areas may be regarded as a sort of lending library. The military issued a catalog of captured equipment which was available in sufficient quantity to loan, free of charge, to American industry [9]. A procedure was available to obtain this equipment for destructive tests.

The second area was the Air Force Museum. After the war the Air Force base allowed the general public to view part of its collection. Captured airplanes and equipment were displayed. A number of years later the Air Force disposed of the foreign material. A large quantity of the radio equipment was sold to a scrap dealer in Fort Wayne, Indiana. Tons of German radio gear filled the yard. One building contained thousands of tubes, some with Air Force Museum tags still attached. Fortunately, a few local collectors gained access to the yard and were able to save a small number of tubes [10].

RECOMMENDED READING

There are currently two books in print which contain a wealth of information on WW II German tubes. Both books are written in German but are well worth translating. Unfortunately, U. S. dealers do not currently carry them. Both should be considered essential to the serious collector of WW II equipment.

Handbuch der Wehrmacht-Röhren is written by Werner Gierlach. Thousands of wartime tubes are catalogued in this 301-page volume. This book is written in a manner understandable to most collectors with an electronics background. The material is presented in logical order.

Telefunken WM-Röhren "Ringbuch" is a 300+

* Drahtlostelegraphische und Luftelektrische Versuchsanstalt Graesfelfing/Flugfunkforschungs Institut Oberpsafsenhofen, a private research group near Munich, eventually taken over by the German government.

page compilation of original factory instruction sheets. Characteristic curves and complete data are given for a great number of wartime tubes. This book makes it possible for the advanced collector/-engineer to detect substitutions or make an educated guess at identifying the tube to go into an empty socket.

ACKNOWLEDGEMENT

The writer wishes to thank Bro. Patrick Dowd for supplying the CV64 magnetron, a vital missing link in illustrating this story.

REFERENCES

1. GE Tube Museum file card for tube no. 931.
2. GE Tube Museum file card for DTW magnetron. (A second type of DTW magnetron may be found in the Udo Radtke collection in Germany.)
3. B. L. Griffing letter, Sept. 28, 1955, to Joseph Fetsch. Griffing was an engineer who worked with the U. S. military in interviewing German tube designers.
4. L. A. Sibley, "Secret Tubes For Radar: The Western Electric 700-Series," AWA Review Vol. 7 (E. Stroudsburg, PA, 1992), p. 53.
5. SIGESO #56, U. S. military report on captured German high frequency tubes.
6. Ludwig Mayer letter, Oct. 27, 1955, to Joseph Fetsch. Mayer was a tube expert who had worked for the DVG/-FFO.
7. Werner Gierlach, Handbuch der Wehrmacht-Röhren (Köln, 1985), pp. 88-91.
8. Joseph Fetsch, notes in personal files.
9. "Foreign Equipment Catalog - Section V - Communication & Electronic Equipment," T-2 AMC Technical Intelligence, Air Materiel Command, Wright Field (Dayton, Ohio, June 1946).
10. Mike Feher, telephone conversation with the author, Sept. 1993.
11. Dr.-Ing. Herbert Doring, letter to Udo Radtke, June 3, 1992.
12. As [7], p. 274.
13. G. Goubau and J. Zenneck, Naturforschung und Medezin in Deutschland 1939-1946, Band 15, Elektronenemission, Elektronenbewegung, und Hochfrequenztechnik (Wiesbaden, Dieterich'sche Verlagsbuchhandlung Inhaber W. Klemm), also known as the Fiat Review of German Science, Electronics volume, p. 217.

THE AIR FORCES CATALOG OF GERMAN EQUIPMENT

The USAAF catalog of foreign equipment to be loaned offered 220 tube types (magnetron, receiving, transmitting, rectifier, etc.), ranging from "A409" to "146360," plus CRTs of 25 types. (It also listed 11 common Royal Air Force tubes as "German!") Most of these were ordinary types (AZ1s, ECH11s, RV12P-2000s), but it is unfortunate that the stock did not eventually find its way to, say, the Rochester tube auction!

Besides tubes, the catalog listed several German avionics systems, numerous subunits, and their test sets. The user could borrow complete systems with the "black boxes" neatly mounted on laboratory backboards and cabled, ready for testing. It may be informative to cite some of these. The following is adapted from the USAAF listings. (There are problems of typography and format in the original; we have corrected these as far as possible.) "FuG," short for "Funk Geräte," translates as "radio set" or "radio apparatus." - Ed.

Radio Set - Command VHF (FuG 16 family). The FuG 16 was used primarily in large aircraft, on 38.0-42.5 MHz [AM], approximately 10 W output. The set may incorporate remote fine tuning and frequency control. The design of some of the components was taken from the FuG 17. Components of FuG 16: Transmitter & Receiver Unit FuG 16, Dynamotor Power Unit U-17, Antenna Matching Unit AAG-16, Control Motor (receiver remote) FA-16, Inter-Communication Unit, Mounting UF-17, Switch Intercommunication FBG-16, Mounting UF-17, Antenna Systems AAG-16 and AAG-16-2.

The FuG 16*Z* was the standard set used in single-seater fighter aircraft, with frequency and power as above. Not interchangeable with FuG 16, it differs in having a fixed DF loop to provide MCW transmission for ground DF control and homing, besides 2-way R/T transmission. Contains a two-spot frequency remote control unit and a switch clock for automatic periodic MCW transmission. Components of FuG 16Z: Transmitter & Receiver Unit FuG 16Z, DF Unit ZVG-16, DF Loop Antenna, Frequency Switch (remote) FS-16a, Transmitter Remote Tuning FA-16S, Switch Selector AD-18, Mounting AR-16Z, Junction Box VK-16a, Mounting ARZ-16, Junction Box and Relay; also U-17, AAG-16, FA-16, UF-17, and FBG-16 as for FuG 16.

The FuG 16*ZE* has a modification to incorporate Benito (Y-system) retransmission feature for more accurate GCI ranging than possible with ground DF. Components of FuG 16ZE: Transmitter & Receiver Unit FuG 16ZE, Receiver E-16ZE, Modulator and Antenna Meter BG-16ZE, Antenna Matching Unit (receiver) AAG-16E-1, 16E-2, or 16E-3, Antenna Matching Unit (Transmitter) AAG-16, 16-2, or 16-H, Connecting Box AD-18E.

The FuG 16*ZY* replaces all other known units of FuG 16. It incorporates R/T, MCW, homing, Benito retransmission, and four frequency remote-control selectors. Components of FuG 16ZY: Transmitter & Receiver FuG 16ZY, Junction Boxes AD-16Y, AD-17Y, and AD-18Y; antenna for ground use, BA-16.

Radio Set - Command VHF (FuG 17) "Fritz." The FuG 17, made by Lorenz, was the original VHF set used in aircraft, operating on 42.1-47.9 MHz. It served as a model for the FuG 16. Components of FuG 17: Transmitter & Receiver Unit, Dynamotor Power Unit U-17, Receiver E-17, Antenna Matching Unit AAG-17, Antenna Mast HS129, Mounting AR-17, and Distribution Box PK-17.

The FuG 17*E* was a modification of FuG 17 to include Benito retransmission facilities used as a part of Y-Geräte. Its components: Receiver section E-

17E, Transmitter section S-17E, Modulator section BG-17E, Retractable Antenna AM-5, Retractable Antenna Control Unit BG-5, Mounting AR-17.

FuG 17Z was a modification of FuG 17 to include a fixed DF loop and electronic switching unit.

Radio Direction Finder Peil G6. This was the standard homing receiver (0.15-1.20 MHz), very compactly built, used with FuG 10. Components: Receiver EZ-6, DF Loop PRE-6, Aerial Matching Unit AAG-6, Loop Rotating Assembly APR-6, Junction Box UD-6a, Amplifier VS, Control Box VRP-6, Dynamotor Unit U-11A, and Mounting REZ-6.

Altimeter - Radio Absolute (FuG 101). This set, made by Siemens & Halske, used frequency modulation, with 0-150 and 0-1500 m ranges. Components: Transmitter S-101, Receiver E-101, Transmitter Base Plate ECS-101, Receiver Base Plate ECE-101, Dynamotor Power Unit U-101, Indicator.

FuG 101A, an improved version with the 1500-m range reduced to 750 m, used Transmitter S-101A and Receiver E-101A.

Altimeter - Radio Absolute (FuG 102). This set, made by Siemens & Halske, used a CRT to present altitudes of 0-5000 m. Transmitter frequency is 180 MHz; pulse repetition rate is stabilized by a 29.5-kHz crystal. Components: Transmitter S-102, Receiver and Indicator Unit AT-102, Receiver Sub-Unit E-102, CRT Indicator Sub-Unit ANZ-102, Dynamotor Power Unit 102, Dipoles (2) D-102, Transmitter Mounting Frame ARS-102, Receiver Mounting Frame ARE-102, Power Unit Mounting Frame ARV-102.

Altimeter - Radio Absolute (FuG 103). The FuG 103, made by Gema Apparatefabrik, is accurate and readable to 15 m at normal temperatures. Frequency, 430 MHz; peak power, ca. 100 W; mean power, ca. 0.5 W; pulse width, 0.1 μs at ½ peak; bandwidth, 7 MHz; indication, CRT with an ingenious optical anti-parallax device, circular scale, 0-5 km linear, spot brightening; zero pulse duration, ca. 0.3 μs; max. height, ca. 12 km over land. Power supply, 36 V, 500 Hz, 3 ø, through 24-V motor-alternator. Components: Transmitter S-103, Receiver E-103, Indicator S-103A, Power Unit U/10E.

Radio Set - IFF (FuG 25A) "Normah Erstling." The FuG 25, made by Telefunken, was designed to respond automatically with coded tones to Würtzburg radar transmissions (5000-Hz modulation). A neon light indicates transmissions. Receiver frequency 550-580 MHz (spot); transmitter frequency 150-160 MHz (spot). Components of FuG 25: Transmitter-Receiver SE-25; Power Unit and Tone Generator ("Tongeha"); Mounting Frame AR-25, Code Switch and Control Unit BG-25, Aerial Matching Unit AAG-25, Junction Box UD-25, Resistance Box WK-25.

The FuG 25A, produced by Gema, was designed to respond automatically with either of two coded signals to Freya radar transmissions. Receiver frequency, 123-128 MHz swept, transmitter frequency 148.5-162.5 MHz (spot). Components of FuG 25A: Transmitter-Receiver SE-25a, Aerial Matching Unit AAG-25A, Motor and AC Generator U-24a; also AR-25, BG-25, UD-25, and WK-25 as for FuG 25. Checked out with PSE 25a portable test set.

Radar Set - Tail Warning (FuG 217), "Neptun." The FuG 217 was the production series of the FuG 216 with a number of improvements. Components: Control Box SchK-217, Transmitter S-217, Receiver E-217, Antenna AL-217, Distributor Voltage HV-217, Indicator SG-217, Dynamotor U/10S.

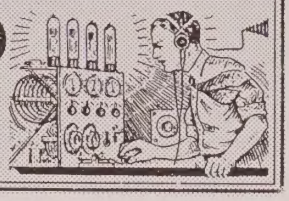
Radar Set - Aircraft Intercept Forward Search (FuG 220), "Lichtenstein SN2." The FuG 220 is one of the later German Forward AI sets, installed in twin-engined night fighters and working between 36 and 120 MHz. Transmitter output was 1.2 kW and receiver sensitivity better than 5 μV. Components: Transmitter S-220 Series 4, Receiver E-220, Indicator SG-220, Antenna DAK-220, Junction Box VDSG-220, Mounting V-10/S, Mounting Bracket RSG-213, Control Unit AU-220, Mounting RSG-220, Receiver Selsyn Tuner FBG-213, H. T. Power Pack HGL-213, Power Unit U-10/S, Hand-Operated Aerial Switch HU-220, Hand-Operated Aerial Switch IA, Modulator Switch SchK-213.

Radar Set (FuG 224) "Berlin." The Berlin FuG 224 is almost an exact copy of the British H2S, which was one of the first centimetric radars in use. The scanning system consists of four dielectric-rod elements and does not seem to have been designed for optimum scanning polar diagram. The scan speed is 6.7 rev. per second. The indicator uses magnetic instead of electrostatic deflection for the PPI tube. Components: Transmitter, Receiver, Indicator, Control, Rotary Inverter Unit, Low Voltage Power Supply, Scanner, Distribution Box.

Radar Set (FuG 227), "Flensburg." This homing receiver was designed for use against the "Monica" tail-warning radar in British bombers, with frequency range 173-233 MHz and sensitivity better than 10 μV. Components: Receiver E-227, Indicator SG-227, Control Unit BG-227, Remote Control Switch M/Sch-227, Power Unit U 10/E, Control Unit ARSG-227, Mounting Frame, Elevation Aerial.

Receiver - Radio Intercept Direction Finder (Type HE-1). An intercept receiver (ground) with range of 70-3620 kHz and an IF of 56 kHz. "The sensitivity of this receiver is poor." Bandswitching is accomplished by a rotating cylinder as is common in German sets. Power supply is low-voltage battery, 4.8 [V?] NC [nickel-cadmium?] 10 [A-hr?]; plate battery, 100 V; or mains power supply NA 1. Power consumption is 0.45 A at 4 V (filaments); 0.9 mA at 50 V (screens); 18 mA at 100 V (plates). Circuit: RF - Mixer - Local Osc. - IF - Detector - AF. Tubes: Three RE084 triodes, three RES094 tetrodes. Height 13-9/16", width 14-5/16", depth 9", weight 48.5 lb.

AMATEUR RADIO



EDITED BY
Mike Raide, KF2MW
Box 181, Bloomfield, NY 14443
Please include SASE with correspondence.

OLD-TIME CW CONTEST

A MEMORIAL TO LINC CUNDALL, W2LC

DATES and TIMES: Feb. 9-10 and 12-13. Start at 2300Z Feb. 9 (6:00 PM EST) and end at 2300Z Feb. 10 (6:00 PM EST). Repeat on Feb. 12-13.

OBJECTIVE: Contact the greatest number of AWA members. When calling, use "AWA AWA AWA de W2AN," as an example. On contact, exchange year of equipment, such as "TX 36" for a 1936 transmitter and "RX 34" for a 1934 receiver. Send "MOD" for modern (1942 or later) gear.

RULES: A station will be scored only once on each band. Nonmember contacts, and stations not submitting logs, will not count.

FREQUENCIES: 1800-1820, 3580-3600, 7030-7050, and 14060-14070 kHz, ± QRM. Concentrate 20- and 160-meter contacts on the hour.

SCORING SYSTEM:

QSO Zones: "E" eastern zone: US districts 1, 2, 3, 4, 8, 9 plus VE1, VE2, and VE3. "W" western zone: US districts 5, 6, 7, 0 plus VE4, VE5, VE6, and VE7. "DX" zone: All others.

QSO Points per Contact, by Zone:

"E" to "E" or "W" to "W":	1
"E" to "W" or "W" to "E":	2
"E," "W" or "DX" to "DX":	3

Equipment Multipliers:

Equipment	Multiplier
MOD TX and RX	1
OT TX or RX	2
OT TX and RX	3

Power Multipliers (input to final):

0-2.99 watts:	4. **(Note: 2.99!)**
3-99 watts:	3
100 watts and up:	2

Determining Total Points per QSO

1. Find QSO points for the contact.
2. QSO points X your equipment multiplier X your power multiplier = Total points for the contact.

LOG SHEETS: will be sent to previous entrants. If you have not entered before, write for logs.

SEND LOGS TO: Mike Raide, KF2MW, Box 181, Bloomfield, NY 14443 by April 1.

Examples:

1. W2AN contacts W2LV.
   Both are in "E" zone, for one QSO pt.
   Both have OT TX and RX, for 3 multiplier.
   Both are running 80 watts, for 3 multiplier.
   1 pt. X 3 X 3 = 9 pts. for contact.
2. W2BJI contacts W7BCT.
   "E" to "W" zone contact, for 2 QSO pts.
   W2BJI: OT TX and RX with 80 watts.
   W7BCT: OT RX; MOD TX at 120 watts.
   W2BJI's points: 2 pts. X 3 X 3 = 18 pts.
   W7BCT's points: 2 pts. X 2 X 2 = 8 pts.
3. W2AAU contacts W2AN.
   Both are in "E" zone, for 1 QSO pt.
   W2AAU uses MOD TX and RX, for equipment multiplier of 1; is running 120 watts for power multiplier of 2.
   W2AAU's points: 1 X 1 X 2 = 2 pts.

OT CONTEST FOR EVERYONE WHO WORKS CW

The annual OT CW Contest is a once-a-year opportunity to contact fellow members on our popular CW bands. One need not be a high-speed artist since many participants operate at a casual speed of 12 WPM. A fair percentage use Kenwood, ICOM, and other modern transceivers, although one is encouraged to use vintage equipment. When using modern equipment, please keep your input down, since some vintage receivers can't cope with S9++ signals in heavy QRM. To simplify scoring, write for a Contest log sheet from either Mike, KF2MW, or Bruce Kelley, W2ICE, 59 Main St., Bloomfield, NY 14469. Photos of your early RX or TX are welcome for possible publication.

RESULTS OF THE 1929 TRANSMITTER QSO PARTY

M. D. Hall, K2LP
PO Box 974, Eastham, MA 02642

Call	QSOs	Transmitter and Receiver
KB1UV	11	Hartley, 9 W
KM1N	25	210 TNT, 9W; SW-3
NV1X	25	P-P 45s TGTP; 3-tube homebrew
W1DX	17	210 TNT, 9 W
W1FPZ	23	P-P 45s
W1KSK	18	210 TNT, 10 W; '37 HRO
W1NV	21	45 Hartley; 3-tube TRF
W1YJ	21	P-P 45s TGTP, 9 W; 2-tube HB
AA2CU	17	45 Hartley
AA2ID	26	TGTP, 9 W
K2LP	32	210 TGTP, 10 W
K2OA	48	210 Hartley, 9 W
KE2O	26	01A Hartley, 9 W (!)
N2EZ	10	210 Hartley, 9 W
N2FCZ	18	P-P 210s, 9 W
W2AN	28	210 TGTP, 8 W; SW-3
W2BJI	46	UV-202, 9 W; HQ-120
W2CFY	36	TNT, 9 W
W2ER	49	P-P 210s, TGTP; 3-tube HB
W2FCH	24	TNT, 10 W (original, built 1929!)
W2FW	12	210, 8 W; HB super, 2.5-V tubes
W2HBE	32	210, 8 W; 3-t. HB regen
W2IRS	42	203A Hartley; Homebrew
W2KFG	46	46 TGTP, 9 W; 3-tube HB
W2KTU	33	45 TNT, 9 W
W2LYH	45	211 Hartley, 9 W
W2PX	21	45s Hartley, 7 W; SW-3
W2UK	43	TGTP 210, 9 W
W2VDI	32	P-P 45s TNT, 9 W
W2ZM	57	2-45s, 7 W; SX-101/HRO
KD3OR	3	210; 2-tube regen.
W3BYM	27	45 TNT; HQ-120
W3INV	15	210 TNT, 3 W
W3MNE	24	210 TNT, 9 W; 3-tube regen.
W3OER	23	210 TNT, 10 W
W3VVS	29	210, 9.6 W; HQ-120
WA2DAC	1	½ W
WB3HLH	26	210 TNT, 7 W; SW-3
AA4RM	16	210s Hartley
K4KRE	7	210 Hartley; 9 W
W4VBX	32	210 TNT, 9 W; '36 HRO
W6DJX	13	210, 10 W; '39 HRO
W6TDP	8	210 TNT, 10 W
W7LOG	1	210 TNT, 9 W; HQ-120
K7YIR	6	210 Hartley, 20 W
K8GM	40	210 TNT, 10 W
K8KK	14	P-P 45s TGTP; 3-tube HB
NI8G	33	45s, TGTP
W8JYY	31	UV-202 Hartley, 9 W; SW-3
WD8OFB	4	210 Hartley, 3 W
WB9K	11	210 TNT
W0OG	10	TNT, 4 W

The 1929 Transmitter QSO Party, on November 12-14, opened with a bang on Friday at 6 PM, with good conditions for propagation. Activity was in a frenzy for an hour or so, with a litany of old-time calls like W2UK, W2ER, W1DX, and W2ZM each knocking off any new call that appeared. W2ZM had an artificial RAC note which attracted great attention as occupying lots of the spectrum. On the second evening the RTTY and other commercial QRM around 3585-3588 was horrendous, as well as the traffic net boys, for several hours. Many new calls appeared, especially in the Eighth District, with K8GM, N8EA, K8KK, NI8G, and K8BHZ doing a great job working dozens of stations.

Around 11 PM the Far West began to show signs of activity and W6DJX and W6TDP made at least half a dozen of the slick East Coast operators happy, notably W2ZM, W2IRS, W2ER, and K8BHZ. K6ILM put up a two-element wire beam aimed at the East Coast.

Activity this year improved from 40 to 60 participants. Bob, W2ZM, led the pack with 57 QSOs, followed by W2ER and K2OA respectively. Tommy, W2UK, showed us some nifty operating and that he has never lost the skill he has displayed for over 60 years.

Al Jones, K6DIA, was up in Oregon and did extensive monitoring of the East Coast working the West Coast. His log reflects the disparity between some 10-watt transmitter signal strengths and others.

Many letters, comments, and very good pictures of equipment were received. *Stations known to have participated but no log received: W2TFL, N2KSZ, K5RB, N6JV, K6ILM, W7SEH, N8EA, K8VBL, and KC0CW.*

SUNDAY AM NET CHANGED TO 4 PM

Effective immediately, the Sunday 3837 kHz AM Net will start at **4 PM** instead of 5 PM to allow low-power stations greater opportunity to break through QRM and adverse skip effects. - BK

MEET REPORT - GAITHERSBURG HAMFEST

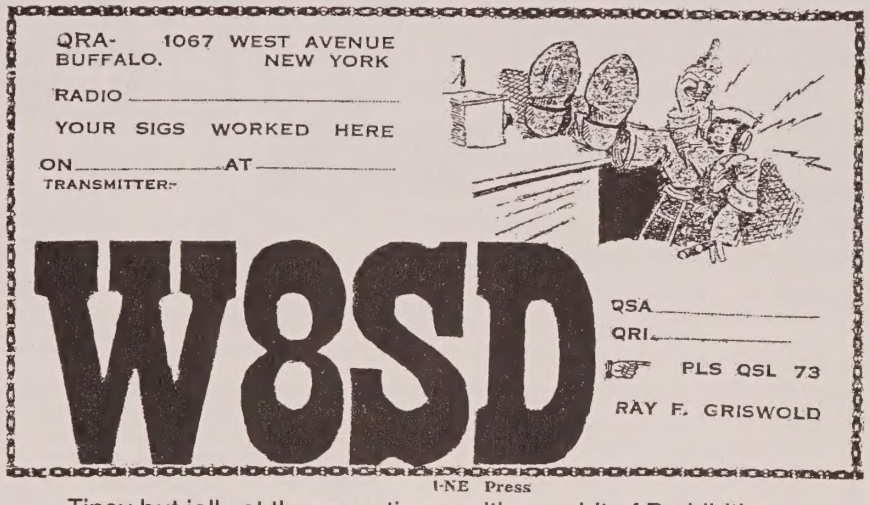
We are advised by Paul Mooney, K4KRE, that the AWA display at the Gaithersburg Hamfest on September 12 was well received, with local members congregating there in good numbers. Evidence of Paul's success in signing up interested parties is visible on this quarter's New Members page. - LAS

QSL CARDS BY "GIL"

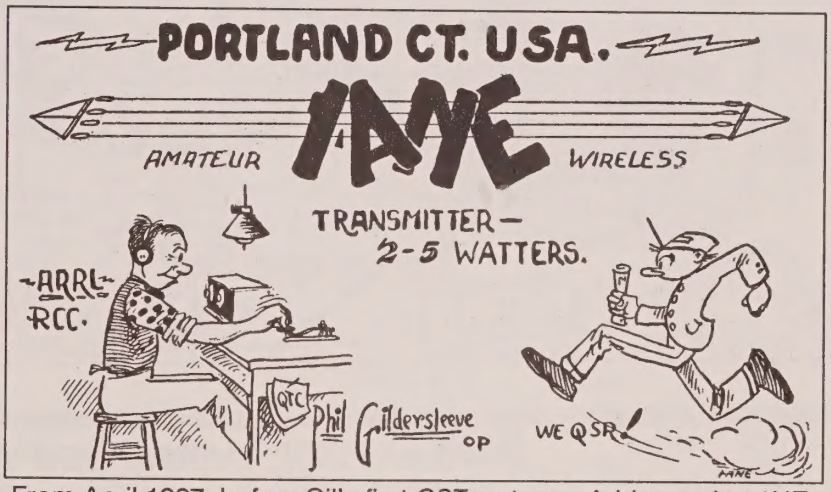
Source material from **John Herkimer**
P. O. Box 54, Caledonia, NY 14423

Anyone who has seen a copy of the American Radio Relay League's journal *QST* dated between June 1927 and 1966 has probably sampled the fine cartoon art of Phil Gildersleeve, better known as "Gil." Licensed during the 1920s as 1ANE, later as W1CJD, the artist was originally a marine radio operator who did much of his cartooning at sea. After a spell at the Disney Studios in Hollywood, Gildersleeve became news editor of the Middletown (CT) Press. His work appeared in *QST* and the Radio Amateur's Handbook until his death in 1966, and has been reused much later. The ARRL suitably commemorated his work in its 126-page 1986 book GIL - A Collection of Classic Cartoons from *QST*, which is still available (No. 0364, $5, from the ARRL, 225 Main St., Newington, CT 06111, (203) 666-1541).

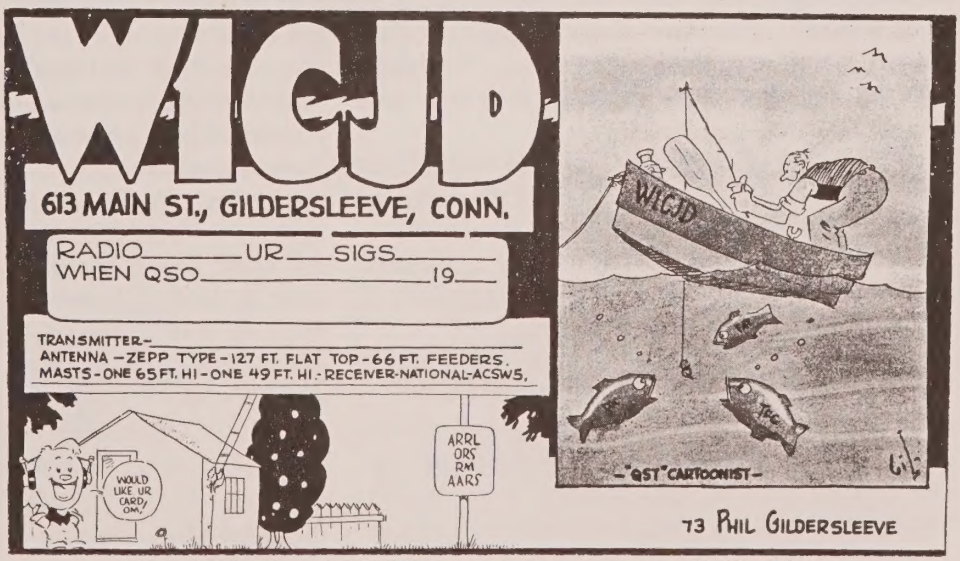
Gildersleeve's work for the ARRL is well recognized. Not so well known, and not mentioned in the ARRL book, is the custom art that he did for individual amateurs' QSL cards in the '20s and early '30s. Fortunately, John Herkimer of the Committee to Preserve Radio Verifications (*OTB*, Vol. 30 No. 2, p. 47) has come up with some samples of this work, presented herewith. The illustrations on these QSLs display the same instinctive "feel" for amateur radio as Gil's cartoons in *QST*. Included are two of his personal QSLs. His ear-



Tipsy but jolly at the operating position - a bit of Prohibition-vintage humor. The illustration is signed 1ANE.



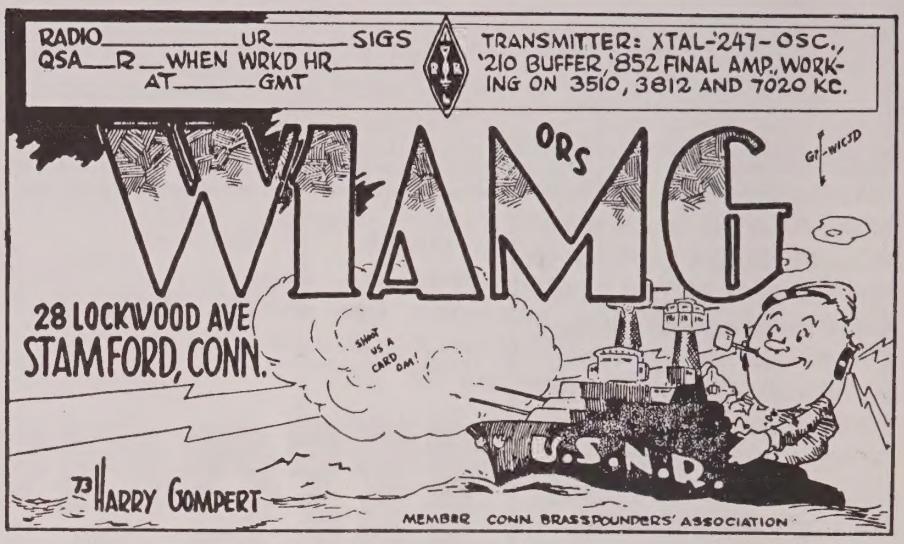
From April 1927, before Gil's first *QST* cartoon. Addressed to 1NE, it carried the message "Dear OM - WL send TT other cartoon along in a day or so OM am QRW as hell, hi."

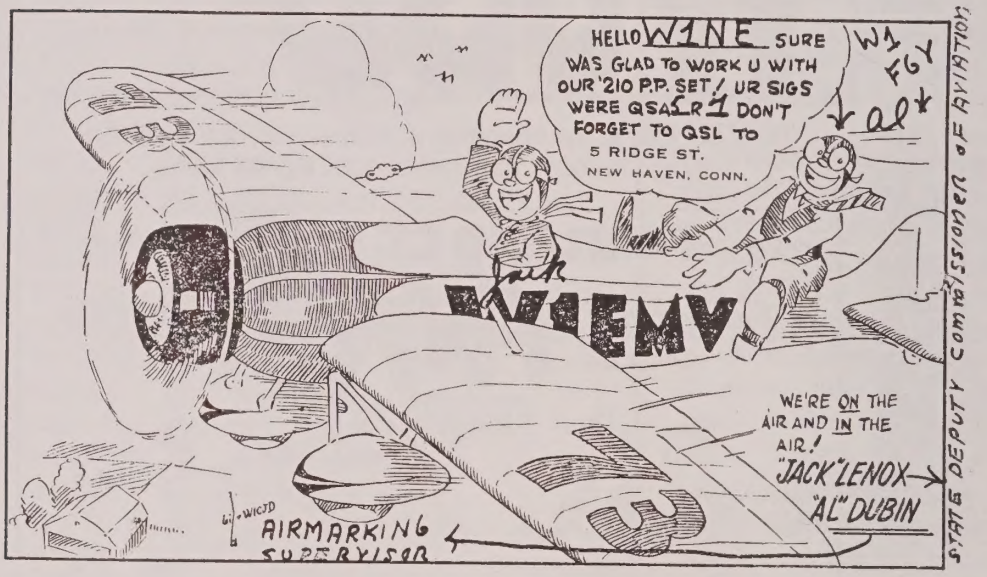


Use of a National ACSW-5 receiver suggests a 1930 or later vintage. W1CJD was in *Portland*, Connecticut, at the time!

ly style was quite different from later drawing technique, but the familiar style evolved quickly, becoming recognizable by 1930.

These examples were originally in the estate of John McMahon, W1NE, of South Norwalk, Connecticut, a QSL printer as well as active amateur operator.





Mailed from New Haven in December, 1932.

MEET REPORT: HARPS, NEW YORK

The 1993 Radio & Phonograph Show sponsored by the Hudson Valley Antique Radio and Phonograph Society kicked off on October 23 with 40+ vendors ready to lure more than 500 collectors to their booths. The show featured radios, tubes, phonos, parts, and paper collectibles. "Software" (78s and cylinders) were available from four new specialty booths.

A big hit was the demonstration of on-site construction of a 39-tube radio by HARPS president Art Kingsley and Peter De Angelo. Lauren Peckham brought AWA literature for collectors. HARPS member Brent Dierolf set up a special Q & A service for inquiries on phonographs.

The all-indoor layout was much more comfortable than earlier arrangements, especially considering the brisk outdoor temperature. A special thank-you goes to Linda Gramm for HARPS' continued success and the growing local interest in our hobby. She again chaired the event and invites all to return to the Holiday Inn, Middletown on Saturday, October 22 for the 1994 event. - Judy Shepherd

Lauren Peckham independently reports the following: "Lots of activity, many tables filling a room about the size we use at the Marriott for the main auction - some talk that larger space will be needed next year. I like meets that include phonographs, as this is another area of personal interest. I found everything from radios-phonographs to piano rolls and a nice music box. Radios included the scarce Radiola II and a rare Tuska 225 (early version with split panel - too bad a couple of verniers and a Bradleystat had been added!). There were also some nice loose couplers, a very early enclosed tuner (case probably not original), a good variety of cathedrals, plastics, and Catalins. Many parts for phonographs were available: needles, reproducers, horns, support cranes, etc. . . . Oh, yes, I had to buy a couple of things - Just had to have one of those beer-keg radios and also found a Hickok Model 533 tube tester . . .

MEET THE COLLECTORS

Rodney Schrock, KD3OR
402 Lincoln St., Somerset, PA 15501

A QRP RIG USING THE WE 311B TUBE

On Straight Key Night, Dec. 31 - Jan. 1, 1992, I had the pleasure of working AA8V, Frostburg, Maryland, on 80 meters. He told me about his rig: a one-tube oscillator using a 6V6. Being interested, I requested a copy of the schematic. The rig was an Ameco, patterned after the one-tube Novice rig in the 1955 ARRL Handbook.

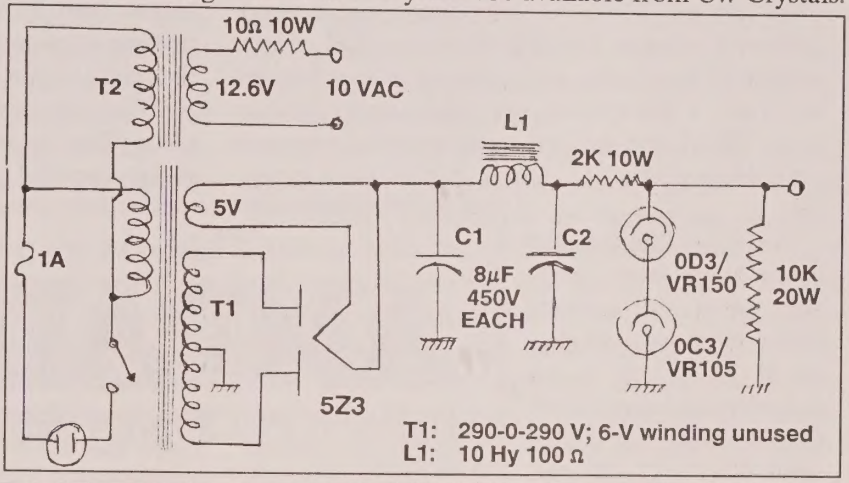
I decided to build one like it, using the venerable Western Electric 311B tube, a low-power pentode that appeared in their analog telephone gear, like "J" and "K" carrier repeaters. It has the following characteristics:

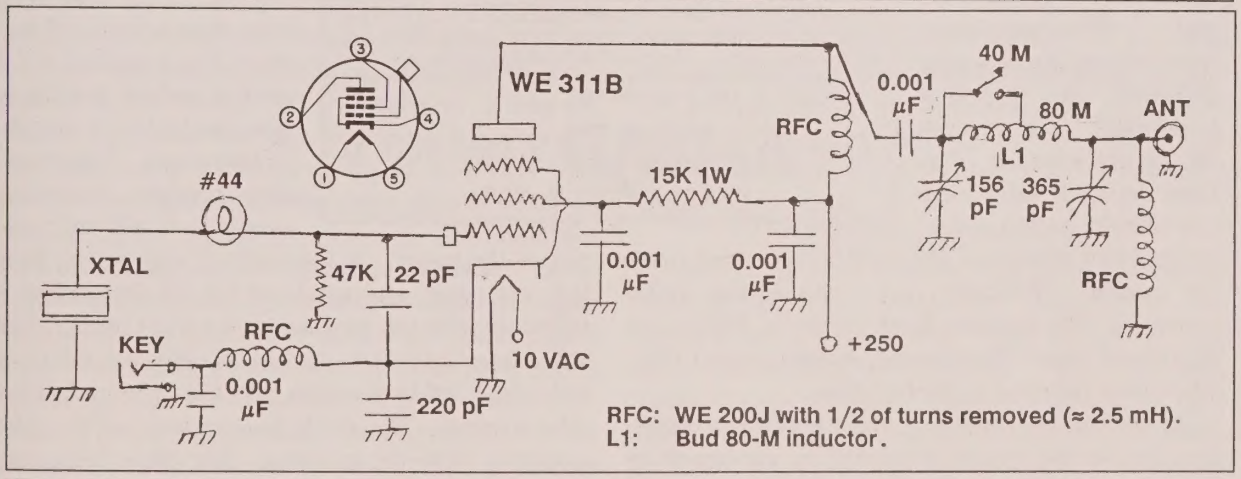
- Heater, 10.0 V at 0.6 A
- Plate and screen volts, 135
- Plate current, 30 mA
- G_m, 2800 μmhos
- R_p, 43K
- Power out, 2 watts

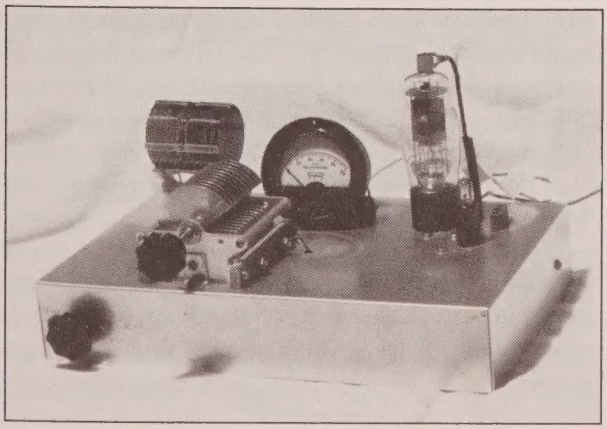
At 250 V on the plate, I get a plate current of 40 mA, delivering three or four RF watts to the antenna tuner, then through the L-net to an inverted-L antenna, my old standby. I built the power supply from the 1949 ARRL Handbook, p. 228. It gives good regulated DC, hence a steady note.

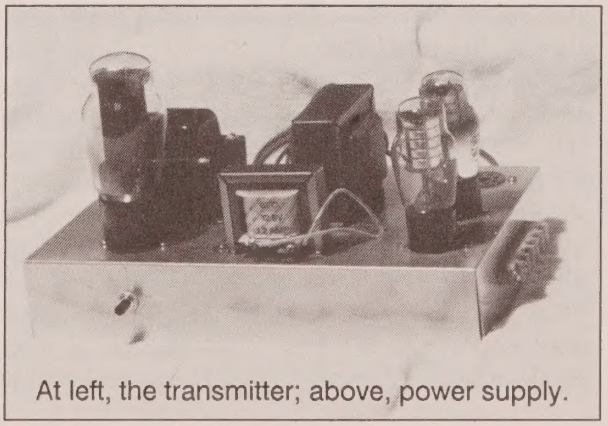
On 40-meter CW, I get reasonable good DX - East Coast, Midwest and southern U. S. My *closest* contact was Harold, W3PVG, seven blocks away. 80 meters was disappointing - very low activity, except SK Night. I was asked a lot of questions - what power, what kind of tube - a triode?, etc. The receiver is a National HRO.

If you build the transmitter, you can use a stronger tube - 6V6, 6F6, etc. I used the 311B to be different. Crystals are available from CW Crystals.









At left, the transmitter; above, power supply.

ELECTROLYTIC CAPACITORS

D. K. Owens
478 Sycamore Drive, Circleville, OH 43113

To many people, electrolytic capacitors are mysterious "black boxes" inhabited by gremlins and evil spirits. A lot has been written about "reforming" electrolytics (Refs. 1, 2) and whether old units should be used. In this article, I hope to shine some light into that "black box" and make some recommendations based on years of practical experience with electrolytics.

ELECTROLYTIC CAPACITORS

The electrolytic capacitor was developed to meet the need for large capacitance in a reasonable-size package. The Mershon Electrolytic Condenser, owned by AMRAD, was on the market as early as 1925. Battery eliminators were increasing in popularity and required filtering of the raw DC. Paper capacitors were bulky and rarely came in values above 6 μF. Consequently, very high values of inductance (30 H and up) were required for adequate smoothing of the DC. These chokes were expensive.

The
AMRAD
MERSHON CONDENSER

A thoroughly tested product. It has been used extensively during the past six years by expert radio amateurs for filtering plate supply in their transmitting equipment, which is a very severe requirement. The Mershon Electric Condenser is even better adapted for smoothing "A" and "B" filter circuits used in conjunction with radio receivers.

The AMRAD Corporation
MEDFORD HILLSIDE, MASS.

In spite of the fact that electrolytics were available when AC-powered radios were mass-marketed in 1927, only a few manufacturers used them. Crosley (who had bought AMRAD), AC Dayton, and Browning-Drake were among the few who featured the Mershon Condenser. The reasons for this are not clear. Perhaps the early units were not reliable or the licensing royalties consumed any savings from using smaller chokes. Whatever the reasons, the major companies like Atwater Kent, Majestic, Philco and RCA used paper filter capacitors until around 1931, when they switched to electrolytics.

The electrolytic capacitor, like any other, is merely two conducting plates separated by an insulating (dielectric) medium. The electrolytic is just constructed in a novel way.

If aluminum foil is made the anode in a cell containing a solution of borax and boric acid in water, a thin layer of aluminum oxide is formed on the surface of the foil when DC current is passed through the cell. For a given voltage, current flow soon ceases because the oxide layer is an insulator. Raising the voltage will cause current to flow again until the layer has increased in thickness to where it acts once more as an insulator. This process is called anodizing. The layer is hard and compact and its thickness is a function of the anodizing voltage. Since this layer is an insulator, it can serve as the dielectric of a capacitor. Very thick oxide layers tend to be loose and fluffy so that electrolytic capacitors are generally restricted to ratings of ~500V or less.

The "wet" electrolytic capacitor is constructed by mounting the anodized foil on a metal post and folding or coiling it so it will fit into a metal can. The post is insulated where it passes through the can and serves as the positive terminal. The can is the negative terminal and is lined with a perforated fiber sheet to prevent metallic contact between the foil and the can. The can is then filled with electrolyte (usually similar in composition to the anodizing solution) and sealed. The aluminum foil is one plate of the capacitor, the oxide film is the dielectric, and the electrolyte solution is the other plate. The can serves only to contain the liquid and make electrical contact with it; it is not the other plate of the capacitor. The can has a safety vent to relieve pressure in case it overheats. Both sides of the foil are active so that the effective area is twice the actual area.

The so-called "dry" electrolytic capacitor is no drier than a "dry" cell battery. The anodized foil is used as before, but the liquid electrolyte is absorbed into paper. The electrolyte contains thickening agents so it will not drain out of the paper. A sandwich of wet paper, plain foil, wet paper and anodized foil (in that order) is rolled up with the anodized foil on the inside. The roll is inserted into an aluminum tube with the plain foil connected to the tube, and the open end of the tube is sealed. The anode foil is connected to a wire emerging from the end seal. The plain foil serves only to make good contact between the wet paper and the metal container. This cathode foil, as it is called, is not a plate of the capacitor; the electrolyte solution is still the other plate. The second strip of wet paper ensures liquid contact with both sides of the anodized foil and prevents metallic contact between the anode and cathode foils.

Electrolytic capacitors pack high capacitance into a small space for several reasons. The capacitance of a parallel-plate capacitor in pF = 0.225 AK/d, where A is the area of one plate, K is the dielectric constant of the insulator between the plates, and d

is the distance between them. All dimensions are in inches. In an electrolytic capacitor, K of the oxide layer is very high, ~10, compared with 2 to 3 for paper and plastics. The thickness, d, is on the order of 20 millionths of an inch for a 450-V unit, which is 10 times thinner than the plastic film and ~40 times thinner than the paper in a conventional capacitor of the same voltage rating. Both sides of the foil are active, so the electrical plate area is twice the geometric area. Thus the goal of high capacitance in a small package is achieved by manipulating the variables in the capacitance equation. Another trick to get higher capacitance is to roughen the foil by etching with acid before anodizing. The effective surface area of an etched foil is greater than that of a smooth foil of the same dimensions.

Because the oxide layer has sub-microscopic pores, the normal leakage current of an electrolytic is much higher than other types of capacitor. American National Standards Institute (ANSI) Standard C-62 (formerly JAN-C-62) gives the permissible leakage current in mA as $Cx + 0.3$, where C is in μF and $x = 0.02$ for 150-V capacitors and 0.04 for 450-V units. Thus a 20-μF/450-V capacitor is allowed to have 1.1 mA of leakage current.

The old "wet" electrolytics were very forgiving. They withstood surges without damage and were self-healing to a great extent. They had to be mounted vertically so the liquid would cover the anode foil. Their chief weakness was electrolyte leakage, easily identified by a white crust around the bottom terminal post or the top of the can where the cover fits on. In the most common form of construction, the post was covered with a rubber tube and the can crimped around it. The rubber functioned as both a seal and an insulator. When the rubber hardened with age, the solution leaked out and evaporated. Without the liquid, we do not have a capacitor. Sometimes the oxide layer is damaged beyond repair or gets contaminated with impurities and the leakage current becomes excessive. In extreme cases the heat generated can cause the liquid to boil and the safety vent takes over (you hope). I remember seeing a Stewart-Warner set years ago in which the vent failed to work, with spectacular results. The can exploded and blew liquid all over the set and the wall behind. The 80 rectifier got so hot pumping current into the capacitor that the glass envelope softened and collapsed around the elements. I have also seen "dry" electrolytics explode.

"Dry" electrolytics can also lose their liquid by evaporation through hardened rubber end seals. The result is a loss of capacitance. Dried-out electrolytics of any kind cannot be restored to operation. A high hum level with low B+ voltage is a strong sign of dried-out capacitors. Capacitance decrease can also occur under conditions of high ripple current. The plain cathode foil can become anodized to the extent of the ripple voltage. It then becomes another capacitor in series with the anode foil, reducing the total capacitance. Good power-supply design can avoid this, but early supplies were often not well-designed due to lack of knowledge and experience. One thing no electrolytic can forgive is reversing the polarity of the applied voltage. Like a diode, an electrolytic has a positive and a negative end, resulting from the fact that the oxide layer has a positive charge. Heavy current will flow if it is hooked up backward, and the damage is irreversible to the capacitor and maybe to your power transformer and rectifier tube as well.

Old-timers will recall that the electrolytic rectifier was almost identical in construction to a "wet" capacitor. An aluminum strip was the positive electrode and a solution of borax or baking soda the negative. A lead strip was used to make contact with the solution. As soon as AC passed through the unit, a polarized layer formed on the aluminum, allowing current to flow in one direction only. Unlike capacitors, these rectifiers were constructed to handle heavy forward current.

A lot has been written about "re-forming" old capacitors, based on the observation that the charging and leakage currents in an electrolytic capacitor which has been idle for a long time are initially high and taper off after the unit has been under voltage for a while. Defects have developed in the oxide layer, causing the high initial leakage current. As these spots become anodized again, the current drops off. The "re-forming" procedure consists of hooking the capacitor to a variable supply through a milliammeter and raising the voltage slowly, never exceeding 10 mA into the capacitor. If the rated voltage can be reached without exceeding 10 mA, the leakage current is monitored until it drops to the value calculated from the formula given above. If it doesn't or if the unit gets warm, the capacitor should not be used.

EXPERIMENTAL RESULTS

I got out my stock of electrolytics and "re-formed" them by the above procedure. Some were new, modern units, others were "new old stock," and some had been previously used. None had been under voltage for years. Except as shown, all were name-brand American units. The results are shown in Table 1. Re-forming does not change the capacitance value. Capacitance was measured before and after forming, with no significant difference in values. Units A-F bore dates on the cases. Units H, J, R, and S were multiple-section units. Units H, J and M failed to meet ANSI C-62 and are unusable. They were left at rated voltage for 1 hour and still did not meet the standard. Take special note of the remarkably low leakage current of modern Japanese capacitors. The American capacitors required several minutes to reach minimum leakage current with the voltage being raised slowly, whereas the Japanese units reached minimum current immedi-

TABLE 1

Unit	C_s	C_m	I_p	I_m	I_h	Remarks
			450-V CAPACITORS			
A	10	13.4	0.84	0.46		New old stock (1962)
B	10	11.7	0.77	0.37		Same
C	10	10.6	0.72	0.23	0.16	Same
D	10	11.9	0.77	0.34		Same
E	10	12.2	0.79	0.46		Same
F	10	12.9	0.82	0.43		Same
G	20	18.2	1.03	0.45		Used
H1	10	11.6	0.76	1.27	1.23	Used, got warm
H2	10	14.4	0.87	3.00	1.45	Same
H3	10	11.5	0.76	2.10	1.10	Same
J1	20	24.0	1.26	2.19	1.60	Used, got warm
J2	20	24.8	1.29	1.98	1.30	Same
K	8	9.6	0.68	0.54		Used
L	10	13.1	0.82	0.66		Used
M	16	20.5	1.12	1.54	1.10	Used, got warm
N	10	10.0	0.70	0.04		New Japanese
O	10	11.2	0.75	0.06		Same
P	22	20.1	1.10	0.04		Same
Q	22	20.6	1.12	0.02		Same
			150-V CAPACITORS			
R1	40	36.7	1.03	0.25		New old stock
R2	20	17.5	0.65	0.14		Same
S1	50	60.3	1.51	0.01		Used Japanese
S2	30	38.2	1.06	0.03		Same
T	33	32.4	0.95	0.01		New Japanese
U	33	34.0	0.98	0.01		Same
V	47	45.0	1.20	0.03		Same
W	47	48.6	1.27	0.06		Same
X	47	47.6	1.25	0.03		Same

Cs: Stated value on unit (μF)
Cm: Measured value (μF)
Ip: Permissible leakage (mA) based on Cm (ANSI C-62)
Im: Measured leakage (mA) after 5 min at rated voltage
Ih: Measured leakage (mA) after 1 hr at rated voltage

ately and the voltage could be promptly raised to the operating value.

RECOMMENDATIONS

When transistorized circuits came along, designers wanted to use R-C coupling because of its cheapness and simplicity. Because of the low impedances of transistors, large coupling capacitors are required to avoid low-frequency attenuation. Electrolytics were the logical choice, but their relatively high and unpredictable leakage current upset the bias on the following stages. This is one reason why the very early transistor circuits were transformer-coupled. Research, mainly in Japan, soon led to very low leakage capacitors. Note that the leakage values for Japanese capacitors in the Table are a tenth of those for a good pre-1965 American capacitor. This exceptionally low leakage suggests that ANSI C-62 is no longer a meaningful standard and should be revised.

I follow a rigid rule with electrolytics: **ALL ELECTROLYTICS IN AN ANTIQUE SET ARE BAD, WITHOUT EXCEPTION!** *Period!* I don't bother to test them; I replace them. Modern capacitors are so good that I see absolutely no reason to risk destroying an irreplaceable power transformer trying to use rejuvenated 30- to 50-year-old parts for the sake of appearance. They can fail at any time. I drill holes in the bottoms of wet electrolytics, shake out the liquid if there is any, and put them back in the original positions. The holes don't show and the appearance of the top of the chassis is unchanged. I then wire in new, modern capacitors below the chassis. No new old stock. I disconnect all wiring from the original capacitors. It may be tempting to wire the new unit to the lugs of the old one if it is dried out, but not shorted. Can you be sure it won't short out in the future? If the originals were potted in a special case, I melt them out and install replacements in the case.

OK, so wired-in capacitors may not look original under the chassis, but a lot of replacements some serviceman put under there years ago aren't original either. Who's going to unbolt my chasses and look under them anyway? If you insist on "purity," you can open those cans and put new units inside. Why are we so concerned that invisible capacitors look original? No one seems to be bothered about those old carbon and wirewound resistors we have to replace with modern ones.

Electrolytics have several characteristics worth noting. First, they tend to have high impedance at radio frequencies and therefore don't make good RF bypass capacitors. We have to replace failed paper filters with electrolytics, because we can't get large-value paper capacitors anymore. When we use electrolytics, the set may show instability. The paper filters were bypassing RF as well as hum. Just wire a 0.1-μF "Mylar" unit of the appropriate voltage rating across the electrolytic, and the problem should go away. Second, the leakage current rises with temperature. The increased current creates more heat, and the process can run away. Never mount electrolytics near a big, hot bleeder resistor. Third, when an electrolytic is used for some time at a voltage much lower than its rating, the oxide layer becomes thinner. If such a capacitor is suddenly placed on higher voltage, it may fail. There is nothing wrong with using a 450-V capacitor in an AC-DC set. Just don't take it out and put it in a transformer-operated set without re-forming and

checking it on the test bench. Those wanting more detail about electrolytics should see Ref. 3.

One other electrolytic - the "non-polarized" type - should be mentioned. Back in the 1940s and 50s when Hi-Fi was in its infancy, there was a need for large-value capacitors for speaker crossover networks. It wasn't practical to make them by stacking paper capacitors, so we used back-to-back electrolytics; i. e., we connected two units in series, "+" to "+" or "-" to "-." A lot of nonsense was written at the time about the pros and cons of this practice, but the results were quite satisfactory. Later, manufacturers began making "non-polarized" electrolytics for crossover use. The name is a misnomer. These are polarized like all others, but there are two of them connected in series (back-to-back) in one case. These units will not pass DC in either direction and work well for low-impedance speaker networks. The non-polarized electrolytic is what we had been making all along with our series capacitors.

REFERENCES

1. The following *OTB* references are all on the subject of electrolytic capacitors.

Vol. 7, No. 4, p. 20	Vol. 19, No. 2, p. 16
Vol. 13, No. 2, p. 2	Vol. 20, No. 2, p. 30
Vol. 15, No. 1, p. 23	Vol. 28, No. 3, p. 40

2. *Antique Radio Classified*, Vol. 9, No. 2 (Feb. 1992); ibid, Vol. 9, No. 10 (Oct. 1992).

3. Pender, H., and McIlwain, K., Electrical Engineers Handbook - Communications and Electronics (New York: John Wiley, 1950), Chap. 3.

The name Mershon will be familiar to insulator collectors, in connection with Ralph D. Mershon, early developer of equipment (e. g., insulators, aluminum-cell lightning arresters) for high-voltage power transmission, and president of the AIEE in 1912-13.

Most of us who restore AC radios add new electrolytics under the chassis. This gives the problem of properly supporting the new component - as Owens points out, we don't want to use the mounting stud of the old fixed-can capacitor because the unit may eventually short-circuit. One easy way to get good support is to solder an insulated tie point to the stud, moving the old lead wire(s) to it and attaching the new capacitor there. The tie point can be the little molded cylindrical phenolic kind used in '40s-50s military gear, with a 4-40 thread at one end and a solder post at the other - or an old-fashioned phenolic-strip type. An easier way is to use a one-watt resistor of very high value, say, 470 K or a meg. The one-watt size has strong construction and thick leads, stiff enough to give good support to the new capacitor - that is, our 470-K resistor is effectively a wire-ended support insulator going between the old stud and the new capacitor. - Ed.

(Continued from p. 17)

author for cleaning and restoring antique radio logos are not indicated because they can easily be found on the market.

Different approaches can be used to organize a collection of antique-radio logos. According to the author's experience, the most direct path is to gather the pieces in sets or groups relative to their origin or nature. For instance: audio equipment, domestic and foreign radio manufacturers, a specific brand, novelty trademarks, etc.

For a neat display, the logos are fixed on soft, matte or neutral-colored boards protected by a cover of glass or clear plastic sheet.

Many other aspects of antique-radio logo collecting could be covered. The most interesting one is do-it-yourself logo reproduction, a very useful and often necessary practice to replace missing parts during radio restoration. Since a photograph is "worth a thousand words" the accompanying pictorial sequence illustrates a representative collection of logotypes from antique radios and related equipment.

Photographs: Carlos A. Fazano, 1992; Edison de Freitas, 1988.

A radio logo of a different kind.

REFERENCE

Douglas, Alan, Radio Manufacturers of the 1920s, Vols. 1-3 (Vestal, NY: Vestal Press).

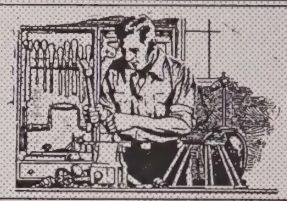
ACKNOWLEDGEMENTS

My sincere thanks to the Brazilian collector Edison de Freitas for letting me use his collection files, and to Jairo Casoy for support and advice regarding preparation of the photographs.

HOMAGE TO A CRAFTSMAN FRIEND

As a radio historian and collector, I have collected and preserved antique radio logos for many years. My interest in this matter is well expressed in my personal letterhead illustration. It is a logotype designed by Mr. Jose Schernthaner, a joyful, skilled and creative designer and a dear friend of mine who passed away some time ago.

EQUIPMENT RESTORATION



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WATCH THOSE TUBE POSITIONS!

Ross Smith

From *Northern Indiana IHRS Newsletter*, Vol. 3, No. 1, Sept.-Oct., 1993, by permission.

An Emerson radio from the 1940s came in for circuit restoration. The first thing to be done was to check the tubes, clean the tube pins and put a bit of Vaseline on the pins to retard oxidation. (A film of lubricant helps to clean the socket pins when the tube is placed in and out of the socket a few times.) After replacing bad capacitors, cleaning and lubricating the tuning capacitor with WD-40, and making other repairs, the set was checked for B+ shorts with an external power supply having poor regulation. With no shorts or leakage indications, the set was plugged into the AC line, which turned the pilot light on but gave *no sound*. Since the sockets were not marked and there was no tube chart in the cabinet or on the loop antenna, tubes were tested one at a time and replaced in their original sockets. On close examination it was found that the IF amplifier and converter tubes had been switched. After placing the tubes in the correct sockets, the set worked fine and was ready for IF and RF alignment. Also watch for *wrong tube numbers* in a set. I have had this happen twice.

"VISUALIZING" TUBE ENGRAVINGS

John H. Walker Jr.

16112 W. 125th St., Olathe, KS 66062-4302

There's a small tip for "bringing out" those branded-in letters and numbers on tube bases so they can be seen in a display or photograph. I know that a lacquer paintstick is normally what would be used but I favor an easier and less permanent method: baby powder! A small amount of the stuff can be spread over the branded-in area and the excess wiped off. The tube can then be photographed or displayed. The powder can be removed at any time with a wet cloth. I suppose this method would work as well with any other branded or engraved part.

AVOID UNEXPECTED PLATING

John H. Walker Jr.

We all know (at least I think we do) that one of the best ways to clean small metal parts is with Tarn-X liquid silver cleaner. As it's not cheap, I try to get as much mileage out of a bottle of the stuff as I can, but one must beware when cleaning different metals. I've found that if you've cleaned a lot of silver-plated parts, there's a high concentration of silver in the left-over solution. If brass parts are then cleaned in this solution, the brass will be plated with a light layer of silver! I found out the hard way, and now have a nice WD-11 with silver base and pins! Since then I have used separate containers to clean different metals.

Sounds like the trick in the A. C. Gilbert chemistry set of old, where you copper-plated a steel nail by immersion in $CuSO_4$ solution. On the other hand: is this potentially an easy way to dress up silver-plated tubes, etc., where the plating has failed and the brass beneath is visible? The silver deposited this way is probably only a few atoms thick, but should give good appearance.

GRILLE-CLOTH TIP: CURING THE SAGGY, BAGGY BLUES

John Okolowicz

624 Cedar Hill Rd., Ambler, PA 19002

People have been asking how to install grille cloth to insure a minimum of wrinkles over time and through changing weather conditions. The answer is simple: add water.

Modern repro grille cloth is made from either rayon or polyester. While this is not as sensitive to moisture as, say, cotton, this stuff does absorb moisture - rayon a little more so than poly. By spritzing the cloth lightly with water prior to installation on the sound board, the cloth will relax and stretch. When it dries, the cloth will shrink and insure a nice tight finish.

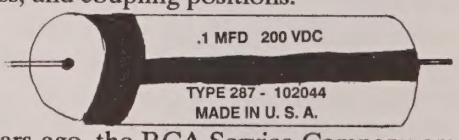
This is the same trick that was used in model-plane building during the '40s and '50s, when kids put tissue paper over a balsa-wood frame. (Does anyone remember back this far?)

THE OHMMETER WON'T DO

Alton A. DuBois, Jr.

67 Peggy Ann Rd., Queensbury, NY 12804

The pictured capacitor nearly fried my old RCA scope. I had been suspicious of these capacitors and checked all that I found in the scope in filter, bypass, and coupling positions.



Years ago, the RCA Service Company employees suspected them also, especially in the video coupling to the CRT. This un-named bird I had tested only a day before and it showed OK on an ohmmeter, so I left it in, mainly because I didn't have an 0.1-μF 200-V capacitor around.

Anyone finding this cap in an old set should voltage-check it instead of using an ohmmeter.

REPLACING CAPACITORS IN MILITARY-TYPE "BATHTUB" ASSEMBLIES

Bob Haworth, W2PUA
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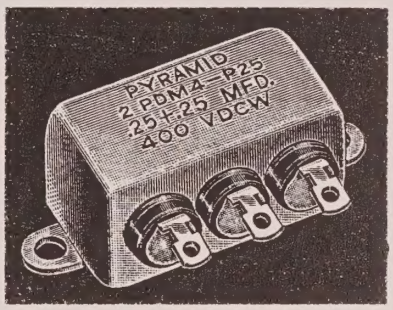
Yes, some readers are going to say "Hey, this guy's nuts, those capacitors never fail." That may be true for hermetic-sealed units (I've had great luck with them) but alas, the military bathtub was not a true hermetic (glass-seal) capacitor and time takes its toll. They seem to take better than twice as long to fail as an ordinary wax-sealed paper unit of 1940s vintage, and a greater percentage of them are still good, but, at 50-odd years old, they *do* fail.

What caused me to find a way of restoring these units? A chance encounter in which I fell heir to my dream receiver - an RCA AR-88. One of the first wartime units produced during 1939-40, the receiver contains six multiple-capacitor bathtub units.



My S. O. P. in restoring equipment is to check all filter and bypass capacitors before slowly raising the AC to the unit with a Variac. In this test I found several of the bathtub units reading "high" in capacity and showing excessive leakage. All other capacitors were either micas (where I have found only one or two bad units in 10 or so years of restoration) or oil-filled power capacitors (which again are winners).

With replacement necessary, I undertook a resurrection method that retains the form, fit and function of the original unit. To the perfectionist reader, I dedicate the remainder of this article!

First, I have experimented with two types of bathtub capacitor. These are ones in which the terminal areas are sealed with a red-colored rubber-based substance, and those that have a black or dark gray material that appears to be hard rubber or plastic. I have had no luck reworking the red-sealed units - the substance melts during unsoldering and the terminals loosen in the metal case. This prompted me to ash-can a few units and stick with the black-sealed units only.

Replacement of the capacitors in bathtub units is fairly straightforward. The tools required are an X-acto knife, cutters, long-nose pliers and a 40-watt soldering iron with a large, flat tip. It is helpful to have a small vise equipped with two small pieces of 1/4" plywood between the jaws. This helps hold the capacitor without draining heat away from the work. I have replaced units without this assist but you are forever chasing the "hot" bathtub around the table.

Replacement follows these steps:

1. Unsolder and clean both the solder lug and the terminal area on each capacitor terminal. I heat and shake the solder off. When the solder is removed from the terminal area, a small lead hole becomes visible in the terminal center. The capacitor wire (usually stranded) is removed from this lead hole and from the solder lug where it connected.

2. Put the cap in the vise with the bottom side up and heat the solder seal around the edge. Be careful - as you heat the unit and pry off the bottom, the wax inside will melt and may sputter out. The hot wax will be under pressure and can splash several feet.

3. As the unit heats up, work the X-acto knife into the long seam opposite to the terminals. It may be necessary to loosen the vise slightly to relieve force on the seal. Once the knife has developed an open seam (watch the wax!) it is necessary to work toward one end, heating both the long seam and the end. Prying with the knife will help. Then work toward the other end. Soon the back will act like an opening door; it is necessary only to heat the terminal side, and the back pops off - usually without ripples or creases.

4. At this point, after pouring off the wax, the old capacitors may be removed and new ones installed.

5. When capacitors are of the bypass type (grounded to case), to be sure of a solid ground, I drill a small hole in the end of the case (away from mounting lugs), pull the leads through, trim and solder. One could solder to the inside of the case but I am leery of the joint I would have after reheating the case in replacing the bottom cover. The hole-and-solder technique is foolproof.

6. The installed caps are then resoldered at the terminal area and solder lug. Clean the area where the back will re-install with the soldering iron. The back should then re-install easily (with maybe a hammer tap or two) - solder around the back and the job is done - looking just like original.

Well, not quite like original - I found that this is possible only with a brush and some alcohol which unfortunately may remove any lettering printed on the capacitor. A dry transfer for cap value and voltage and a spray of polyurethane will eliminate that problem.

So, the AR-88 is now completely restored, looking original, and it takes only 20-25 minutes per bathtub to make it that way.

OMNIGRAPH DISK CODES

Neil D. Friedman, N3DF
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In the course of acquiring the occasional Omnigraph clockwork code-practice machine, I have accumulated 34 different aluminum code disks. While I have no maker-printed copy of the code text, the disks are easily transcribed, by either playing them on an Omnigraph or "reading" the points and blunt ridges on the disks' edges as code dits and dahs.

Each disk has a designation consisting of a letter and a number ("A3," "J6," etc.) stamped into one side near the edge. A disk may be "read" with the designation side up, beginning at the edge just clockwise from the designation.

The numbers, which appear to run from 1 through 9, indicate a particular lesson. The letters indicate the order of disks within a lesson. Thus, lesson 3 consists of A3 followed by B3, C3, etc.

The highest letter in my collection is "O" (in lesson 9). As an instruction manual states that the ten-disk model Omnigraph came with five sets of 15 disks and "O" is the fifteenth letter of the alphabet, it seems likely that most lessons contained disks from "A" through "O."

I have no disks from lesson 1. Lessons 2 and 3 consist of short, repeated words in Continental code with wide spacing between letters. Examples of text from these lessons include:

A2: CAN CAN CAN EAT
B2: EAT EAT FAT FAT

and

K3: RAIN RAIN RAIN
N3: ARMS ARMS ARMS

The speed of the code depends on the setting of the Omnigraph motor, but in any event it is quite slow. While the spacing between letters and words decreases in the more advanced lessons (allowing more and faster code to be sent), the length of dits and dahs and the spacing between them remains constant throughout the lessons.

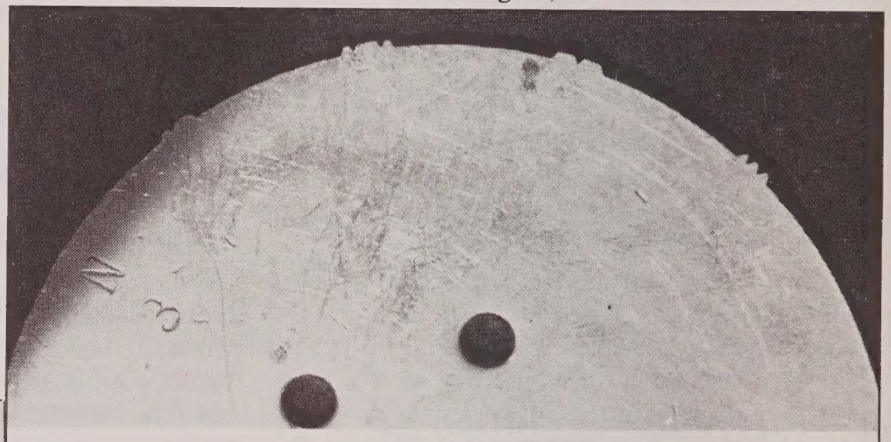
I have no disks from lessons 4 or 5. Lesson 6 appears to consist of random words and groups in American Morse. Lessons 7 through 9 consist of formal radio messages in Continental code, with a tendency toward the dramatic. For example:

K7: RECD FM HATTERAS WED 5 AM SEVENTEEN HUNDRED
L7: TURKISH HUSSARS ARRESTED WHILE AT SCUTARI

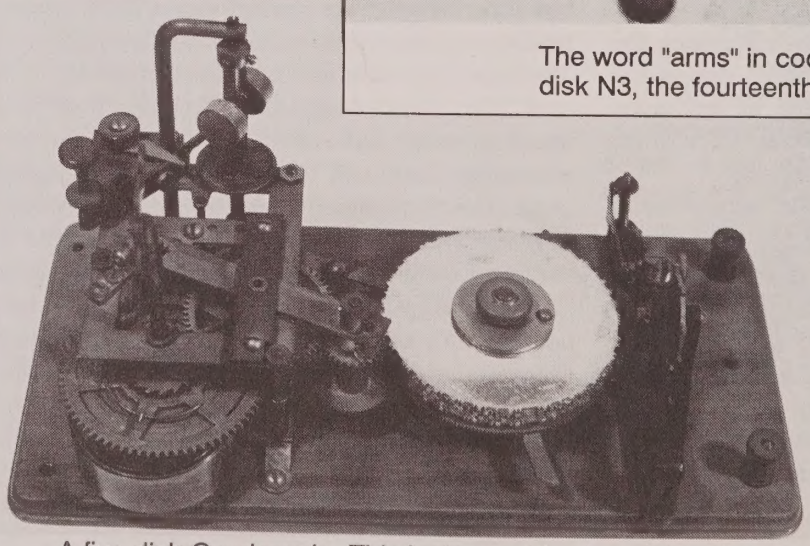
and

C9: SRF SRF SRF DE K RNL RNL K -- HAVE ONE
D9: HUNDRED RESCUED FROM SS RUNDALE LOST ON

These messages include numbers, procedural signs, and a liberal sprinkling of names of people. In lessons 6 through 9, code is sent at about three times the speed of lessons 2 and 3 (assuming a constant motor speed).



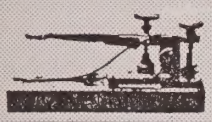
The word "arms" in code on the edge of disk N3, the fourteenth disk of lesson 3.

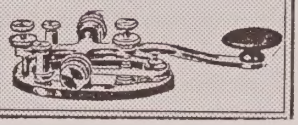


A five-disk Omnigraph. This instrument is also pictured on page 52 of Vintage Radio and the Feb. 1981 cover of *CQ*.

Surely additional code lessons were issued during the approximately 20 years that Omnigraphs were marketed (about 1907 to 1927). After all, early Department of Commerce radio regulations specified that operator-license code tests be given by Omnigraph "whenever possible." I would welcome correspondence related to other lessons.

KEY and TELEGRAPH





EDITED BY

Roger W. Reinke
5301 Neville Ct., Alexandria, VA 22310-1113
Please include SASE with correspondence.

PATINA vs. POLISH (Part II)

In Part I we pleaded for an outright ban on steel wire brushes within 25 feet of a brass telegraph instrument, and especially for the goal of doing no irreversible harm while restoring an instrument to its original condition. We'll attempt here to share the techniques and materials used by several collectors. No guarantee, of course, but some of these tips may save time and frustration, to say nothing of potential damage to a valuable investment.

RESTORATION MATERIALS

Beyond the common shop tools, a supply of steel wool of at least #0 or finer (through #0000) is basic, and some grades of emery cloth will be useful. Polishes for brass seem to be a matter of personal preference; I like "Brasso." "Simichrome," "Noxon," and regular household copper cleaners are noted also. Dental department: regardless of what polish is used, have some old toothbrushes handy for removing polish from corners, and especially screw threads and all knurling. Ask your dentist for his or her old scrapers, etc., because they can be useful in removing corrosion from the slots of frozen screws, for example. A vise with jaws faced in hardwood is needed to secure brass adjusting screws for removal, and is indispensable when undertaking the delicate task of straightening bent screws. Steel jaws will mash the knurling or threads, and there may be no recovery from that mistake. Speaking of brass adjusting screws and the jam nuts that usually secure them, a set of taps and dies comes in handy when corrosion or abuse has taken its toll. The most common adjusting screws and jam nuts are in 8-32, 8-36, 8-40, 10-32, 6-32 and 6-36 sizes. The early instrument makers, however, seemed to choose whatever thread sizes they damn well pleased, including 5-36, 7-40, 9-48, and others in between. Finding these odd sizes is a challenge, and I know of no tool-supply house that currently offers them. It is worth while searching for ancient taps and dies, because one of the most frequent problems in restoration is straightening bent adjusting screws. There's no sure way of doing this, but at least the inevitable damage to the threads can be corrected with the right die. Some use a hand-held motorized tool with a selection of brushes to get at hard-to-reach spots, but be sure the brush won't mar the brass.

INSTRUMENT LACQUER

If the instrument was lacquered originally but now requires stripping, polish on steel wool, with a lot of rubbing, is one approach; a commercial lacquer remover will save much effort, however. "Lac-Off," made by the Brite-Wipe Co., 118 Monticello Ave., Jersey City, NJ 07304, (201) 434-2869, works well, and keeps working even after it turns black. A gallon (smallest size available) costs $20 plus UPS shipping, but it's worth it. Another product is "Safest Stripper," made by 3M. After polishing, should you wish to relacquer the piece, ordinary lacquer, thinned, will work satisfactorily, but professional conservationists use "Incralac." It also is comparatively expensive; a quart costs $27.41 plus a $9 "hazardous material" charge, plus shipping, but it lasts a long time - I've used it on instruments I cleaned up fifteen years ago, and it shows no deterioration thus far. Consider the labor-to-materials ratio! "Incralac" is available from Conservation Materials, Ltd., 1275 Kleppe Lane, #10, Sparks, NV 89431, (702) 331-0582. If you wish to replicate the shade of lacquer used by Bunnell and others, Behlen Master Solar-Lux non-grain-raising stain, B503-09A25, a light orangish-yellow, can be mixed to suit. After stripping and polishing a piece but before applying the first coat of new lacquer, it's important that all traces of polish be removed. A brief soaking in trichloroethylene, a degreaser, is very effective, but the chemical is toxic and poses a degree of hazard. It must be used in a well-ventilated area and with minimum exposure. A safer approach is plain old soap and water, followed by a rinse in lacquer thinner. Some collectors prefer simply to apply a good-quality paste wax over the polished brass. "Rubin-Brite" polish ($11.55 for a 5-oz. jar) and "Renaissance," a micro-crystalline cleaner/polish ($18.60 for an 8-oz. jar), are available from University Products, Inc., 517 Main St., Holyoke, MA 01041, (800) 628-1912. Don't apply lacquer to screw threads, wherever they are found.

OTHER INSTRUMENT COMPONENTS

Coil covers on older sounders and relays were made of hard rubber, which over time may take on a brownish discoloration. (The sulphur in rubber is the culprit; coil covers on later, 20th century instruments are brass.) Soap and water usually helps, followed by a paste wax containing carnauba (avoid silicone waxes). Coil covers break easily, and there's often a chunk missing or at least a crack. Rotating the cover to put the damage out of sight is an option, and perhaps replacement with a good

cover from a "junker" would work. The problem here is getting the old cover off, or even unfrozen. The only method I know of is to heat the cover gently until it expands enough to move.

Steel or iron armatures and magnets, and sometimes the pivots on older keys, may show rust. It's tempting to soak the parts in "Naval Jelly," but most collectors suggest brushing with a fine stainless-steel hand brush. Applications of successively finer grades of sandpaper may be needed. These components were blued originally, and a competent restoration will include re-bluing - but the "real" bluing process can be replicated reasonably well with a product such as "Hoppe's Gun Blue" or "Oxpho Blue," available from gun-supply houses.

Wooden bases, if in reasonably good shape, may need only furniture cleaner applied with fine steel wool. Varsol or turpentine applied the same way may be more effective on grease or oil stains. If stripping is necessary, judicious use of a commercial stripper using fine plastic scrubbing pads, followed by an application of a water-based stain to match the original color, and finally a couple of coats of a good-quality *spar* varnish should do the trick. Rub the last coat of varnish down with #0000 steel wool followed by a coat of good paste wax, and the result will look very close to the original. Do not use a polyurethane varnish; this is not your kitchen floor!

If the instrument you're restoring was nickel-plated, chances are the plating is worn or shows blisters, with corrosion beneath. Nickeled steel key levers always seem to have lost most of their plating. Nickel can be removed by carefully soaking in a very weak (10%) solution of hydrochloric acid, if that's available. If not, a lot of rubbing with fine sandpaper is indicated. Nickel-plated instruments usually commanded higher prices, and a true conservator will replate the instrument if that's how it was found. Replating can be done commercially, but it's expensive; it is not really hard to do at home, but it's a topic space does not permit covering here. [See *OTB*, Vol. 33 No. 2, June 1992, pp. 34-35 - Ed.]

THE LAST WORD

In the final analysis, restoration techniques are quite subjective, and as long as no permanent damage occurs to the instrument you're working on or to yourself, try various processes and materials to see which works best for you. The old saw about a task - if it's worth doing, it's worth doing right - surely applies. Proceed with care and be assured that there will be a sense of accomplishment that's hard to duplicate. A French author* observes that "Like [the] 'British style,' whose principal quality is to remain unnoticed, restoration should also remain discreet. No gleaming copper, no finish that looks too new, no brass too brilliant, no bakelite varnished over . . . the purpose of a collection is to show present and future generations what the objects shown looked like and how they performed." Those are words of wisdom.

Thanks to John H. Holman, Jr., Murray Willer, Larry Nutting, and David R. Pennes for their contributions to the fine art of instrument conservation.

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* Biraud, Guy, Restoration and Preservation of Scientific Apparatus for Collections (Fontenay: Société Historique de Radio, 1987), p. 12.

(Continued from p. 23)

14. SIX- OR MORE TUBE RECEIVERS. Superhets are the usual entries, including most communication receivers, but many others qualify, especially the electric radios of the '30s.

15. SPARK TRANSMITTERS AND ARTIFACTS. Do not hesitate to enter a major piece of spark equipment if you think it is rare or significant.

16. VACUUM-TUBE TRANSMITTERS. Some of the sets for this class are old, some not so old, most home-built. Entries have been predominantly amateur-operated, but commercial gear is welcome.

THE CRAFTSMAN CATEGORIES

17. RESTORATION OF APPEARANCE. This category is to display examples of rebuilding and refinishing the cabinets and containers that housed a radio receiver. No particular kind or size of set is required. A description of the work done will be considered an important part of the entry. The critical element is appearance, including woodwork, escutcheons, dials, knobs and other visual details

18. RESTORATION OF OPERATION. This category is for craftsmen who artfully substitute modern parts for old failures. The new electrolytic in the old can is a starting example, or the transistorized tube, or the replacement of potmetal parts by silver-gray colored epoxy castings. An entry should be accompanied by documentation showing the basis of the updating while preserving the quality of the original.

19. NEW-FOR-OLD. Over the years we have had special equipment and devices that did not pretend to be old. Each was a construction using functional parts to perform a task directly related to radio history. A excellent entries in this category were the scanning TV system entered two years ago. and last year's Federal Superhet. Imagination, craftsmanship and effective operation are the main judgment values here. The entry should be something that might have been, or should have been, or perhaps *was* produced long ago.

NEW MEMBERS

AWA welcomes the following collector-historians. We list all new members routinely - if your name does not appear within six months, please advise the Editor. If you do not wish to be shown, just mark the application form accordingly. AWA does not provide an address list or other directory of its membership.

R. **Ahmann**, W7SC, ID; James J. **Allen**, KC6VWV, CA; Michael **Anthony**, ON; David R. **Arnold**, ON; Noel **Beauchamp**, PA; Carl D. **Beier**, MI; Paul J. **Bennett**, MI; Joseph P. **Bergstein**, PA; Willis T. **Bird**, W4WUL, FL; Bruce **Birke**, WA2ZNO, NY; Kermit **Black**, PA; John W. **Black**, PA; Richard W. **Bligh**, FL; Edmond **Bordeau**, NY; Harvey J. **Bowersox**, Jr., PA; Paul D. **Bowman**, OH; Mort **Brewer**, W6JU, CA; Don **Bridge**, OH; Samuel **Bryan**, OH; Dave **Campbell**, VE3ZZY, ON; Jose I. **Cangas**, Spain; Walter M. **Chambers**, TN; Anne **Christopher**, MA, Promo director, WCOD; Frank P. **Ciganek**, WI; Dr. Mark **Clark**, DE; Henry D. **Clarke**, W2IQ, TN; Gerald **Clift**, CO; Larry **Cogan**, AL; Dennis Edward **Craft**, AZ, Collins Radio, Motorola; Spencer L. **Cromwell**, CA; Ted **Dacheff**, ON; Bert **de Kat**, VE3DPB, ON; Rod **Deakin**, NR7E, CA, KFS Communications; Mark E. **Delauter**, OH; Pierre **Demerseman**, France, Curie Institute; R.J. & Krista **Dial**, CA; Clifford P. **Dice**, OH; Barry **Durinda**, NY; Wayne C. **Eaton**, NY; Frank **Esposito**, KB3AHE, MD; Barry **Ethridge**, GA; Andy **Filean**, IA; Michael **Foley**, NY; Ron **Follmar**, TX; Geoffrey **Fors**, WB6NVH, CA, Quement Electronics; Bjorn G. **Forsberg**, CA; David J. **Frank**, ON; John C. **Freeman**, W7KPB, NC; Samuel **Giansante**, NY; Brion C. **Gilbert**, N0AE, IL, Comm. Eng., FCC, Denver; Phillip S. **Gilliana**, IL; Michael **Girosky**, OH; Dennis **Gjerseth**, WI; Louis de **Gonzague**, NY, Lafayette Radio, TV-radio (self-employed); Thomas **Goodrich**, VA; DeForest C. **Gould**, IL; John C. **Graff**, NY; Dick **Grote**, CA; Ralph **Gull**, CA; Robert L. **Gunshor**, KD9B, IN, EE Prof., Purdue Univ.; William A. **Haase**, WB4UET, VA; Richard A. **Hagrman**, CO; Kevin **Hansen**, UT; Shozo **Hara**, JA1AN, Japan; Larry M. **Harbaugh**, VA; Dave **Harris**, NY; Greg **Hase**, NY, elec. eng., Keane/General Dynamics; Paul G. **Hearne**, VA; James H. **Higby**, IL; William **Hoffman**, NY; Oriel **Jacinto** Fuentes, Rep. of Panama; Joe **Jacobs**, NY; Edward J. **Jarmolowicz**, MA; John A. **Jenkins**, OH; David P. C. **Jensen**, BC; John D. **Jeremy**, PA; Bob **Johnston**, NY; Bryan R. **Knudsen**, WI; Jeffrey **Korneff**, KA3WOJ, PA; Peter Kent **Kurdzionak**, N1MDE, MA, radio-TV repair; Arthur J. **Kyle**, KC4YME, VA; Ray **Lamont**, CT; Allan L. **Lapekas**, MI; Christopher **Leippert**, NY; Craig A. **LeRoy**, NY; Donnel P. **Lewis**, MO; Robin **Lindgren**, NY; Kevin **Lo**, Hong Kong; William **Longworth**, KM1N, NH; Alan D. **Mackenzie**, CA, electronic servicing; Duncan **MacPherson**, NS; Scott **MacWilliam**, CT; Travis **Mahone**, KD4KEV, AL; Paul W. **Maikranz**, KB2MUQ, NY; Milt **Margolis**, VA; David H. **Markley**, OH; Stephen **Martyna**, TN; Ronald L. **Mayer**, W8KYD, OH; Dean **McBeth**, NY; Ross B. **McGuffie**, TN; Joseph J. **Meagher**, N3KJT, MD, Westinghouse, curator, Historical Electronics Museum ; W. C. **Mellberg**, MI; Daniel H. **Miller**, CA; Franklin J. **Miller**, NV; Hideo **Mitsui**, Japan; Michael **Molner**, NJ; Daniel **Montalvo**, KA3ZOF, MD; Fred **Moore**, K2BRH, NY, WRUN, WKAL, WRNY; Mark **Morello**, APO; Eugene H. **Moricle**, Jr., KD4AUX, VA; John K. **Morris**, NY; A. Robert **Mulley**, NY; Fenton **Nash**, NY; John W. **Nichols**, NC; Carmen J. **Nocito**, NJ; Mark **Oliver**, NY; Felix B. **Pagan**, PR; Steve W. **Parr**, CA; Frank **Pecoraro**, CA; Gale **Perkins**, OH; Bernard **Pigelet**, France; Alan **Piorek**, WB9RAD, IL; Albert A. **Plekker**, PA; Arthur M. **Plummer**, KM6KC, CA; Jon **Prabel**, MO; Robert **Prochnow**, NY; Robert A. **Reid**, WX3G, VA; Jett **Rink**, TX; R. Charles **Rippel**, WA4HHG, VA; John J. **Rivolta**, Jr., VT; Lloyd **Roberts**, AA1DL, ME; Luis A. **Rodriguez**, NY; Wilson N. **Rodriguez**, Brazil; Bob **Roper**, VK5PU, GA, research, Georgia Tech; Joel **Rose**, NY; Marvin **Rosen**, N3BQA, MD; David J. **Sacco**, NY; Bernard **Samek**, MA; Paul **Sass**, WB2HQW, NJ, Elec. Eng., U.S. Army; Douglas **Scarrow**, SK; Russell F. **Schmid**, K2LL, NJ; Steven F. **Schnaubelt**, MD; Frank **Schultz-DePalo**, VA; Simon L. **Sharp**, WA3UAY, DE; Henry J. **Siano**, KA3DJN, DC; Chris **Sieg**, WA3LDI, NH; Ken **Skrivseth**, NX3K, MD; Riggs **Smith**, CO; Mark V. **Stein**, MD; Charles **Stieglitz**, NY; Graham S. **Stubbs**, MA; Charles **Teclaw**, NT3G, VA; Bert **Teeples**, WT5O, TX; Don **Timperon**, VE3FMK, ON, Canadian Forces, aero. radio; Allen **Tomisman**, NY; Ron **Trench**, Jr., WB1EYX, CT; Barry S. **Vaxer**, FL; LeRoy F. **Walburn**, KS; Joseph R. **Waskel**, AZ; Bob **West**, MI; Lee **White**, MA; Mike R. **Willenbroek**, Netherlands; Joseph R. **Williamson**, FL; Gary **Willoughby**, CA; Ken **Wong**, CA; Jerry **Zehner**, N9EOV, WI

ED AND MILLIE LYON'S FARM!

Larry Babcock
8095 Centre Ln., E. Amherst, NY 14051

For years I've heard antique-radio collectors say that the Mid-Atlantic Antique Radio Club meet at Ed and Millie Lyon's farm is their biggest and best event of the year. I had previously felt that the 390-mile drive from Buffalo, NY, was just too far, but for 1993 (October 10) I found myself staying in Hagerstown, Maryland, just 20 miles west of the place, the night before the meet. The MAARC Newsletter had stated that it was OK to arrive any time after 10 AM. My wife Dot and I arrived a few minutes earlier than that and noted that about half of the people were already there and the flea market was quite active.

Over 300 people attended and 60 or 70 sellers set up. The flea market offered little early equipment. There were practically no Catalin sets. A lot of AC stuff was offered: cathedrals, tombstones, newer wood sets, and many with plastic cabinets. I purchased a new golf-ball-sized radio with built-in speaker for $10 and some Stromberg-Carlson sets.

The really nice stuff, of course, was inside the house! There is a good variety of sets beautifully displayed. The walls go clear up to the ridge of the house, so there is room for many shelves of equipment. There are a dozen or so Catalins and two beautiful early superhets (the ones in the four-foot long cases, Leutz C-7, etc.). A Crosley Pup complete with Bonzo advertising figurine dwells on one of the upper shelves.

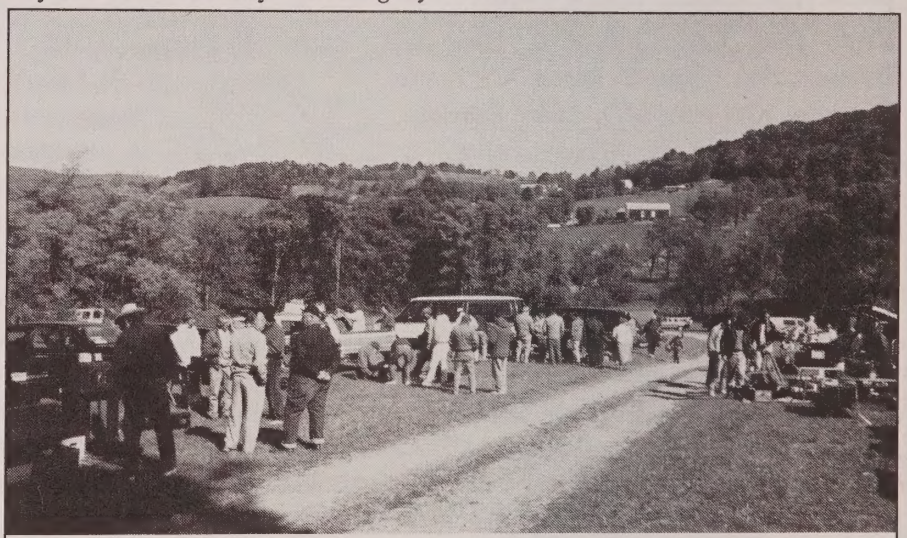
Ed and Millie live 'way out in the country. The scenery is beautiful and the leaves were in full fall color. Things were spread out. I don't think you could yell loud enough for his neighbor to hear you!

The "lunch" was great: all you could eat - fried chicken, hot dogs, hamburgers, cake, etc. Everything was well organized. There were a PA system, two large awnings with seats, and portable toilets.

There was a silent auction and 109 bidders signed up for the regular auction. There was plenty to do but for me the prime activity was the social aspect of the meet. I enjoyed it very much and hope to be able to attend next year. I also hope that it won't be necessary for my brother Ted to have another heart attack and triple bypass surgery to cause me to be in town the night before the meet!

If you go next year, bring a folding chair and a warm coat and hat. If you plan to stay in Hagerstown, make your reservation early - the motels filled up several weeks in advance.

Our agents in MAARC report that Hagerstown is the right place to stay if approaching from the west; arriving from the east, Frederick, MD is a better bet, and slightly closer. - Ed.



October in the mountains - and active trading in the flea market.

(Continued from p. 10)

his Aeriola Grand, the literature he supplied, and his time. Without Ed's generous and enthusiastic help, this article could not have been written.

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RECENT RADIO AND ENTERTAINER OBITUARIES

Charles Griffen, W1GYR
1225 New Britain Ave., West Hartford, CT 06110

Helen Quam Bean, 94, former vice president and majority stockholder in the Quam-Nichols Company, maker of loudspeakers; 1958-59 president of the Electronic Parts and Equipment Manufacturers Association (later the Distributor Products Group of the EIA), first woman to head a national trade organization, and served as treasurer for 18 years.

Lord **Sidney Lewis Bernstein**, 94, founder of Granada Television, London; he retired as board chairman in 1979 but was president until his death.

Charles Britt, Sr., 73, broadcaster and consulting engineer. He was one of the first to devise a multi-city TV market, by founding WLOS in Asheville, NC, and owned other radio and TV stations.

Donald D. Brooks, 87, engineer retired from WAGA-TV, Atlanta.

Jean King, 76, radio's "Lonesome Gal" in the late '40s, popular nationwide.

Richard Salant, 78, one-time president at CBS News. He is credited with expanding network evening news from 15 to 30 minutes, starting "60 Minutes." and guiding the startups of "Sunday Morning" and "The CBS Morning News."

Julian Sinclair Smith, 72, early UHF TV broadcaster; founder of Sinclair Broadcast Group. He started in 1958 by establishing WFMM (FM) in Baltimore. Selling WFMM, he used the capital to start WPGH (TV) in Pittsburgh. His family held three other stations.

Leon Theremin, 97, inventor of electronic musical instruments, best known for the Theremin as introduced commercially by RCA (see Rider's Vol. 1) and demonstrated at Carnegie Hall in 1928. Born Lev Sergeyevich Termen in St. Petersburg, he was educated in music, physics, and astronomy. He worked in New York, inventing the Terpsiphone, "theremin ether wave musical dance platform," on which the movements of dancers yield corresponding musical sounds, and the Rhythmicon, funded by composer Charles Ives, that played different rhythms separately or simultaneously. Returning to the USSR in 1938, he was convicted of "anti-Soviet propaganda" and sentenced to seven years in Siberia. Released to develop military electronics during WW II, he was pardoned after receiving the Stalin Prize for his work. He then worked for the KGB as a scientist; became a professor of acoustics at Moscow Conservatory; and was forced out after being written up in the Western press in 1967.

George Townsend, 72, TV-transmitter developer. Beginning his career in 1938 as a staff engineer as WSPR, Springfield, MA, he was CE (1952-63) and then VP-director for WRLP-TV in Springfield. In 1963 he started Townsend Associates to make UHF transmitters. Ampex Corp. acquired the company in 1967. He later founded Spectrum Cable. At his death, he was system manager for Micro Communications Inc., Manchester, NH.

June Valli, 64, singer on the NBC "Lucky Strike Hit Parade" in the '50s, and known best as the voice in Chiquita Banana commercials.

John Walson (born Walsonavich), 78, pioneer CATV operator. In 1948, to aid sales of TV sets in the mountainous terrain around Mahanoy City, PA, he put a tower on New Boston Mountain and ran a cable to a shed nearby which housed several TV receivers. This led to installing a cable from his store to people's houses. By 1950, 1500 subscribers were paying $2 a month each to get three channels from Philadelphia. At his death he was chairman and CEO of Service Electric Cable TV Inc., which serves eastern-central Pennsylvania and northwestern New Jersey.

Carl Frank Woese, 91, co-founder of Robson and Woese. In 1921, he built and operated WFBL ("First Broadcast License"), first station in Syracuse, as announcer, engineer, and interviewer. The station was part of General Electric's four-station New York State Network; grew from 50 watts to 5 kW. The firm of Robson and Woese designed museums and public buildings in New York State.

Thanks for source material to Larry Flegle, Alan Grant, and Bob Thomas, W3QZO.

SILENT KEYS

(AWA members, with or without amateur licenses)

George G. Batterson, W2GB, 95. AWA's founding president is now a Silent Key. The term "Silent Key" is most appropriate, for George was an active radio amateur for over 80 years. Reading of the Titanic disaster, he and his brother built an amateur station in the Fall of 1912. Originally licensed as 8TC, he was issued the call W2GB after WW II. Batterson and Lincoln Cundall, W2LC (another pre-WW I amateur) formed AWA with Bruce Kelley in 1952. George was active on 40 CW until his death in September. - BK

Jim Dates, W2QLI

Len Nole, W4OTN

Robert S. Palmer, W7RD, 93, AWA member for 20+ years (per August Link)

Jim Reddig

Richard L. Willenborg, donor of the Willenborg Collection in the AWA Museum (*OTB*, Vol. 21 No. 2, p. 6) and featured in Inventing American Broadcasting.

THE MAILBAG

Readers' comments on early radio topics are welcome. Because of space limitations, letters that are published may have to be edited. Send all material to the Editor.

CAVEAT RECEPTOR

This is probably not news to many hams but it caught me by surprise: interfering RF signals can originate in your own shack. Having no fluorescent lamps, SCR dimmers, or touch-control lights, I thought I was safe. But an annoying broadband hash on 80 meters turned out to be from a nearby VCR with a matrixed readout. The noise was synchronized with the flashing time display. I was more disquieted to learn that my Magnavox CD player generated RF at harmonics of 4.008 MHz all the way up through VHF, even when it was turned off! Apparently its brain is still functioning - too bad its designer's wasn't. **Alan Douglas**

THE KID WITH THE WAGON

I am a piece of "antique wireless" myself, 75 years old, got my ham ticket in 1934. The picture on the cover of the Nov. *Bulletin* could just as well have been me - I used to tie my wagon onto my bike, cruise around town on "trash pickup morning" and grab up those great old Neutrodynes, etc. Then I'd cannibalize them for parts. This was during the Great Depression. That's how I built ham gear for years! Now these same old sets are worth hundreds of dollars. "*O tempora, o mores*!" **Rock, W9SCH**

The cover picture was most nostalgic: as a boy I picked up old radios and B-batteries from the junkpiles in alleys. Never found real good radios but took the B-batteries and replaced dead cells to bring back the 45 volts. I still do that. **Ross Smith**

Oh, how Mr. Boucher's painting ("Al's Radio Shop") on the cover of the Nov. *OTB* hit home for me! Soon after my interest in radio sprouted in 1937-38, I would visit Raleigh Landes' Radio Shop in Columbia, PA, to talk radio (to beg radio junkers for parts).

One day he called home to leave word for me to come down to pick up some sets he would otherwise put out for the trash man. I rushed down immediately after school and loaded all I could carry on my express wagon. On my return home Dad had come home from work and agreed to drive me down to the radio shop in his Model A to pick up the remainder - 20-some sets in all! A fortune in both parts and "keepers"!

Now you can have your Radiola IV or Grebe CR-5 or whatever - none can compare (for me) with one I picked up that day and the one that had the place of prominence over my radio bench. That radio must have been four feet long, or more! A TRF receiver with tuning dials and filament rheostats extending the full width of that black bakelite panel. I think the name on it was Super Oriole. Perhaps some reader can confirm that - perhaps a picture too? **Charles D. Newcomer**

NON-RCA TUBES

With regard to your tube #52 [in "Tubes RCA Didn't Tell You About," Nov. *OTB*], two grids, tied together, had to be used in filamentary types intended for Class B in order to get the high amplification factor (μ) required for zero-bias operation. The first of these double-grid tubes was the well known 46, which came out in the 2.5-volt tube series, 26, 27, 45, etc., of the late '20s. Raytheon [also did] manufacture a type 49, which was a 2.0-volt two-grid tube. The highest amplification factor possible in those days from single-grid tubes was maybe 12-15. The two-grid tubes gave 40 or so. One could not get the filament-grid spacing close enough in single-grid tubes for higher μ without creating the danger of shorts! It was not until the advent of the single-strand filament that μs above 50 came to be in single-grid tubes. I think the first of such tubes was the 1H5GT Bantam. But by then Class B was out of favor.

Your tube #20 is coincidentally the Raytheon type 20, [related to] the UV/UX-120 . . . RCA manufactured them for use in the output amplifier of the Radiola 25 or 28.

Also I am enclosing a data sheet for the Raytheon BA. An old associate of mine insists it was intended for use (in the mid-'20s) in a combined B and A eliminator providing 0.25 amp through a dropping resistor for a filament string of 0.25-A filament tubes and up to 100 mA DC for B+ supply. It would have been the first series-string application ever! I was an application engineer for Raytheon's Receiving Tube Division in the late '30s. There are only a couple other Raytheon engineers still around who are survivors of those (in retrospect) wonderful days. **Frank M. Dukat**

The D- and F-series Federals, for one, use the BA in just this fashion, with a series string of 201As!

READING FREQUENCY FREQUENTLY

Thank you for the Nov. *OTB* which, as usual, gives me much interesting reading. I note Ray Larson's article on page 46 giving an ingeniously simple way of ascertaining the exact frequency to which a communications set is tuned, so necessary as you say for station location and identification.

Conveniently, although more elaborately, I have made up a digital frequency meter with LED readout to give continuous display of received frequency in conjunction with my Hallicrafters SX-100. This

divides down from a 1-MHz crystal oscillator to give a 1-ms pulse which is used to gate the waveform from the receiver first oscillator. The resultant waveform bursts contain the number of kHz of the oscillator frequency and are then passed to a series of decade counters and 7-segment LED displays.

The display counters are reset every two milliseconds, not to zero, but to the complement of the 1650-kHz receiver first IF, i. e., to (10,000 - 1650) = 8350. Thus the read-out is the actual incoming radio frequency to which the receiver is tuned. For other IFs the counters would be reset appropriately, to 9545 for an IF of 455 kHz, for example.

For finer resolution, I can switch in a further ÷10 counter in the crystal-oscillator chain to get a 10-ms gating pulse, giving read-out to the nearest 0.1 kHz: the switching also changes the display counters' rest values accordingly. The overall accuracy depends, of course, on that of the gating-pulse oscillator; alignment of the IF stages; and the stability of the receiver second conversion oscillator, which is crystal-controlled. I haven't experienced any difficulty from these causes, given a few minutes' warm-up.

To derive sufficient receiver local oscillator signal, I substituted a 6J6 double triode for the 6C4 in the Hallicrafters first conversion oscillator, using the second triode as a buffer and amplifier. The waveform from this is converted to five-volt logic levels by a Schmitt-trigger chip.

When I built this a number of years ago I used the then-current TTL chips, 23 of them in all excluding the LED displays! Nowadays of course it could be done far more economically and elegantly with CMOS devices. But still I find my contraption a boon. **Pat Leggatt**

TESTING THE TESTER

D. K. Owens, in his fine article "When Is a Tube Bad?" (*OTB*, Vol. 34 No. 1, Feb. 1993), does not state what models of tube testers he used to measure emission and g_m. His printed claim that there was no correlation between stage gain and g_m is not possible. There may be none between gain and emission, but the g_m is, by definition, a measure of the tube's amplification, and must correlate. Most mutual-conductance checkers make the measurement at 60 Hz and by an indirect method, but they do apply a signal at the grid and read the amplified effect at the plate. The really fancy testers (Weston Model 686 type 10A, for instance) use a calibrated 1-kHz signal.

Now it's true that a tube's g_m can be correct even when the emission is barely adequate, indicating a short life remaining. But the better g_m testers will catch this too. My Hickok 639C and its Western Electric counterpart KS-15750 L1 have a "cathode activity" switch that temporarily drops the heater voltage by 10%. Let's not paint all tube testers with the same broad brush.

It is often stated (not just in this article) that the best method of tube testing is to substitute a known good one in the equipment and look for any difference in performance. Baloney! Any well-designed equipment does not depend on a certain tube gain to perform correctly, but has a generous gain margin, and feedback loops to minimize variations. In a radio receiver, for instance, plugging in a weak IF-amplifier tube will simply lower the AVC, and the other tubes will take up the slack. There may be no difference in performance, but the gain reserve is gone. Nor will tube substitutions tell anything about remaining life. Substitution is best for checking parameters that a tube tester won't do - high-frequency gain or noise, for instance - or for equipment that is critically dependent on tube parameters. But a g_m check remains the best overall method: a tube that won't amplify isn't likely to do much else! **Alan Douglas**

TESTING THE TESTER - REPLY

Mr. Douglas seems offended that there was no correlation between g_m and voltage gain in the lot of Type 27 tubes tested for my article. As a scientist, I learned long ago not to argue with my data. If the experiment was well planned and correctly run, the numbers you get are not arguable. One's job is to explain them.

The facts are that the g_m of these tubes varied over the range 600-1000, but that there was no correlation with voltage gain when statistically analyzed. The circuit I used duplicated one commonly used in radios of the 1920s.

It would have been nice to have had a wider range of g_m as I did with the Type 45, but I didn't. G_m was measured in an instrument of my own design by shifting the grid voltage a precise amount and noting the change in plate current. I normally do this by shifting back and forth manually, but I can do it dynamically with solid-state switching at any desired rate. I see very little difference between static and dynamic results. Emission tests were run on a Knight KG-600B and confirmed on a Radio City Products Model 323.

I stand by my statement that, if you can't hear any difference between a good and a suspect tube, don't replace it. Of course, the performance is less than optimum, but as Mr. Douglas himself says, the circuit can compensate for that.

The last tube factory in the Western Hemisphere - the former Ken-Rad plant in Owensboro, KY - closed June 10, 1993. Except for a few audio types made in Russia and China, *there will be no more radio tubes*! None of us can afford the luxury of discarding tubes that perform acceptably just because they don't test up to par. We will have to tolerate less than optimum performance if we want to keep operating our radios at all. **D. K. Owens**

Owens' circuit with the Type 27 is special case, common in '20s radios: when the load resistance is infinite, as here, the stage gain approaches μ (= $g_m R_p$), and gain thus depends on both g_m and R_p, i. e., not on g_m alone. - Ed.

CLASSIFIED ADS

Old-time ads are free to members collecting and restoring equipment for personal use. **The rules:** (1) one "sell/trade" and one "wanted" ad per issue per member; (2) include an SASE if acknowledgement is desired; (3) material must be over 25 years old and related to electronic communication; (4) give your full name, address, and ZIP code; (5) repeats require another notice - we aren't set up to repeat automatically; (6) the Association is not responsible for **any** transaction; (7) we may have to reduce the size of the ad to fit space; (8) AWA does not accept commercial advertising; (9) deadline to receeive ads for the May *OTB* is March 12; later arrivals will be held for the following issue. Mail all, repeat, **all** ads to: **Richard Ransley, Box 41, Sodus, NY 14551.**

SELL/TRADE - BC/SW TUBE RADIOS

Arkadyne neutrodyne batt. set, untested, exc. $110; Resona 6 batt. set, untested, exc. to mint, $140. Also many other radios, books & collectable tubes. Send 2 stamps for complete photo-list to Ron Boucher, PO Box 541 (OT), Goffstown, NH 03045.

2000 '50s to '70s radio and TV tubes, most NIB, ½ price. Send want list. AK 33, works, NT, $60; Crosley Gembox, good pot metal, $75; Majestic 50, works, missing lower trim, $150; Radiola 20 floor model, missing base, works, NT, $90; Western Coil & Electric WC-18, needs knobs and dials, works $150. Don Sturzenbecher, Rt 3, Box 28, Sioux Falls, SD 57106, (605) 368-2135.

Trade nice Federal 57 for Amrad double-decker or Paragon RD-5. Need Federal DX-58 cabinet. Merrill Bancroft, 169 S. Row Rd., Townsend, MA 01469.

SELL/TRADE - COMM GEAR

Gon-Set converter, 1500 kHz to 10/11 meters, with tubes, original box and diagram, exc. cond., $25; T-19/ARC-5 xmtr, 3-4 MHz w/tubes, slight mod. to 12 volts and plate supply to osc and amplifier separated, exc. cond., $25. All plus UPS. John Flanigan, RD 2, Box 4550B, Elverson, PA 19520.

Heath 6-meter SB-110 transceiver. Tubes check like new. Unit is in like-new cond. Tad Drogoski, N3JZQ, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703.

National HRO-60T, A-D coils, $350; 8TS speaker, $50; HRO-5TA1, A-C coils, $150; NC-240C + spkr, $125; NC-125, $75; Hallicrafters SC-32 + spkr, $250; Zenith Transoceanic 6A40, $75; Philco 42-150, $75. All plus shipping, discount for pickup. Want HRO-60 "E" coil, consider junkers; coil boxes for HROs; RCA 44-DX mic. Dan Brown, 127 Rand Terrace, Newton, MA 32166.

Reducing my collection of ham radios. Send SASE for list of 25+ radios. Fenton Wood, KB5VQ, 109 Shoreline Dr., S. H., Malakoff, TX 75148.

Meissner "Traffic Master" comm. rcvr (5 bands, 14 tubes, ca. 1938); Heathkit AT-1 xmtr; either for a nice old telegraph key. Richard Ferranti, WA6NCX, 254 Florence Avenue, Arlington, MA 02174-7248, (617) 646-6343.

SELL/TRADE - GENERAL

Cleaning house. Send SASE for list of old books, parts, tubes and rcvrs. Fred Ritter, W4FI, 930 1st Place, Longwood, FL 32750 (407) 339-5727.

Marconi Wireless stock certificate $37.50 postpaid in USA; de Forest BC-14-C 1918 crystal rcvr, mil. model, B.O.; Gonset Communicator IV, 144-148 MHz, $35 plus UPS. Frank Krantz, 100 Osage Ave., Somerdale, NJ 08083.

Pilot AC Super Wasp. Perfect panel and full coil set; *QST* collection including 1915 "copy," 4 1916, complete 1917-40. Charles Byrnes, 1201 Sycamore Terrace - 102, Sunnyvale, CA 94086, (408) 247-3417 or (206) 374-9611.

Roberts R-to-R 1620 series, exc. $45.; Norelco R-to-R EL3528, no cover, $20; Knight KG-635 scope, $35; Knight KG-690 sig. tracer, $35; Eico 150 sig. tracer, $20; Bosch 58 PU only, $75; Majestic 72 cabinet PU only, $75; Philco 38-4, PU only, $75. Robert Rossi, 10936 Melbourne, Allen Park, MI 48101.

SELL/TRADE - KEYS & TELEGRAPH

USN flameproof, 26003, NOS (packed 1955), $60, I ship. Large list of keys, sounders, meters, parts, memorabilia, etc. Send $1 plus 2 stamp SASE to Dr. J. Jacobs, 60 Seaview Terrace, Northport, NY 11768.

SELL/TRADE - LITERATURE

All eight AWA Reviews as a set only, $50 postpaid. Mint cond. hard-cover book "His Master's Voice" in America. Pub. by GE, 1991, $15 postpaid. Ken Greenberg, 4858 Lee, Skokie, IL 60077, (708) 679-8641.

QST, 50th anniv. year (1964), with gold banner on corner covers. All issues fine exc. Dec. showing cover wear, $15 ppd. Leland Anderson, 2525 S. Meade St., Denver, CO 80219, (303) 922-7846.

Rider's Vols. 1-14, Rider's 1931, Sams Folders 1-809, over 1000 TV & radio tubes, BO, sold only as one. Jeffrey R. McDaniel, 569 Winter St., Long Branch, NJ 07740.

Rider's Manuals: Vols. 1-17. Prices range $12 to $85 per volume. LSASE for price list. Sam Faust, PO Box 94, Changewater, NJ 07831.

Rider's Volumes 8, 12, 14. Good, clean cond., $24 ea. ppd; RCA "Red Book" service manuals, 1933, 1951, $22 ea. ppd.; "A Tribute to the Friends of Radio" audio cassette set, 4 sides made by McGavren-Guild Radio Co. consisting of radio commercials from 1920s-80s. In gift box, $18 ea. ppd. Robert Hartje, 87 Newton St., Staten Island, NY 10312.

SELL/TRADE - MILITARY

Battery BA-38 for BC-611, BC-1136, others, new Sept. 93, $42.50 or 12 for $39.50. Choke, 2.5 Hy, 280 mA, 43 õ, upright open frame, 3C317-22, NOSB, $2.50, 5/$10; DY-17A/ART-13, NOSB, $45 plus UPS. Robert Downs, WA5CAB, 2027 Mapleton, Houston, TX 77043, (713) 467-5614.

R-1004/GRC-109 rcvr, 3-24 MHz AM-CW. Small unit measures 8" X 5" X 5". This unit is in an unopened "sealed" shipping box, $45. Bob Tiller, 129 Marly Drive, Syracuse, NY 13219.

SELL/TRADE - PARTS

Transformer, Freed 301002, 800 VCT; other V. 6.3/6.3/5.0, 20 lbs.; choke, Freed 301004 (CFX-11379), 10 lbs.; caps - 400 V, 600 V, 1500 V in cans; audio output - Acrosound Ultra-Linear TO-300, 5 lbs.; audio input Silcor SC7318A-J971, multiple taps. All used except caps. Best offers. Dave Purcell, 11 Longview Ter., Kennebunk, ME 04043.

SELL/TRADE - TUBES & TRANSISTORS

Fix those old TVs - have available used, clean & tested tubes: 11-5U4GB; 14-6AC7/1852; 2-6AB7; 31-6SN7GT; 8-6BG6G; 9-1B3GT and 5-6W4. Any or all for $2 ea. or 3/$5 plus shipping. Also have other TV tubes including Compactrons. What are your wants? Daniel Carella, 39 Mechanic St., Millburn, NJ 07041, (201) 376-2810.

Good used tubes: 802, $5; 807, $5; 809, $5; 811A, $10; 815, $5; 830B, $10; 836, $5; 837, $3; RK-23, $2; 12AT7, $2; 12AU7, $2; 12AX7, $3; plus many others. Rick Yerke, PO Box 392, Moscow, PA 18444, (717) 842-4857.

Have for sale 3 UX-199s, one with an anti-microphonic enclosure; (2) CX-381; (1) UX-216B; (1) UX-210; (1) 210T. Want a matching speaker for my NC-240D. Carl Watson, PO Box 114, Boothbay, ME 04537, (207) 633-3828.

Tubes: BH, $6; 27, $3; 24, $3; 864, $13; 485, $4; 240 in box, new $6; 80, $3. You pay UPS. J. Cadrecha, 292 S. Prospect. St., Burlington, VT 05401.

WANTED - COMM GEAR

Ten-Tec ham-band transceivers, VFOs, amplifiers, etc. like Argonaut, Argosy. Jeffrey Viola, 784 Eltone Rd., Jackson, NJ 08527, (908) 928-0666.

Collins 32V-3, 75A-3, 270G-3 speaker; 800-Hz mech. filter for 75A-3; 51J-4 meter; Paragon RA-10, DA-2. Cash, trade, up or down (AK 10C, BC-15, RA-DA available). Brian Roberts, K9VKY, 3068 Evergreen, Pittsburgh, PA 15237, (412) 931-4646.

Collins 51J-4 in exc. unmod. cond.; Collins 55G-1 tuner; 312B-3 speaker. Larry Cogan, 806 Crawford Ave., Enterprise, AL 36330, (205) 347-0231.

Hallicrafters speakers, R-44 for SX-43, R-42 for SX-42, PM-23 for SX-28, black cabinet with wooden letter "**h**" on the grill for SX-17. Charles Furtak, 241 Oak St., Elmhurst, IL 60126.

Johnson Viking Courier amplifier, Viking 500 and Pacemaker xmtrs. Original Johnson literature and accessories. Bert, N8NN, 2150 Silentree Dr., Vienna, VA 22182, (703) 448-8016.

Late prewar HRO, table model, serial prefix "P" or later, or letter suffix, complete, in good restorable cond. Keith Kunde, K8KK, 8355 Dalepoint Rd., Independence, OH 44131, (216) 524-7698.

National FB-7 rcvr; National CRM 1" scope. Have National SW-3 with doghouse power supply, also HP 200CD audio oscillator. Richard Bauer, K5RB, Hambrick Rd., Dallas, TX 75218. (214) 348-3378.

RCA ACT-200, ACT-150 xmtrs; RCA ACR-111, AR-60, AR-77, AR-77E rcvrs; Millen 80700 VFO; Navy TBY-4 accessories; 801 tubes, large prewar ham-band transmitting crystals with banana plugs spaced 3/4" apart; manual for RCA ACR-136; ARRL Handbooks from '20s and '30s (have 1933 ed. to trade); 1930s issues of *RCA Review*. Trade list for 2-stamp SASE. Don Merz, 47 Hazel Drive, Pittsburgh. PA 15228.

WANTED - GENERAL

Circuit diagram/service manual for Capehart "Panamuse" Model 21N2 rcvr ca. 1946. Diagram for Jewell Pattern Number 535 tube checker ca. 1931; 6AF6G stubby tuning-eye tube. Jack Rhodes, 2700 Burdick Ave., Victoria, BC, Canada V8R 3L9.

Early electrical equipment. Motors, generators, gas-discharge lamps, mercury arc lamps, etc. Also looking for early electron microscopes and pre-1960s television cameras, both military and broadcast type. Allan Weiner, 14 Prospect Drive, Yonkers, NY 10705, (914) 423-6638.

Electro-dynamic high- or low-frequency units by Jensen, Lansing, I. P. C., Motiograph, Western Electric, etc. Sumner McDaniel, 3104 South 147th E. Ave., Apt. O, Tulsa, OK 74134.

Functioning unit containing goniometer, motor and tone wheel from VOR ground-based aircraft navigation system. Also tech literature on same. Bryan Knudsen, PO Box 211, Kenosha, WI 53141.

Heathkit SB-100, -101 or -102, and SB-600 speaker with HP-23 power supply and orig. manual. Cosmetics more important than working cond. Manuals for HP 183B scope and 1841A/1830A/1801A plug-ins. Please state serial-number range on HP manuals. Reasonable prices please. Bob Smith, KC4WJO, 14779 Dogan Drive, Woodbridge, VA 22193-3314.

Model 6A4 adapter for Model 600 Hickok tube tester. Is used for checking Compactron tubes such as 7984 and 7868, and test data on same. Good copy of Radio's 100 Men of Science by Orrin Dunlop, Jr. pub. by Harper Bros, 1944. Restorable AK Model 50. Tad Drogoski, N3JZQ, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703.

Pair of 199 short-pin tubes; red-coloured music box by Electrohome. Gordon Wilson, 1108-50 Ave. Edmonton, AB, Canada T6H 0H9, (403) 434-6257.

Quack medical, scientific, and optical devices, especially violet rays in exc. cond. Richard Cane, 1333 N.W. 127th Dr., Sunrise, FL 33323, (305) 846-7116.

Schematic for Sparton 5-band console Model 134. Pwr xfmr w/pri 115 VAC, w/secs. 2.5 V @ 7 A, 2.5 V @ 7.8 A, 5 V @ 3 A, HV sec 700 VCT @ approx. 250 mA. Clarence Bauer, KV4BY, 1707 Guldahl Dr., Titusville, FL 32780, (407) 268-0916.

Two Electro-Voice 6098 mike preamps plus new EV-654 mike. $80 plus UPS takes all. R. Gordon Graves, 5701 Pimlico Rd., Baltimore, MD 21209, (410) 466-2979 eves.

Vintage headphones, headphone parts, advertising, brochures, plugs, accessories. Will trade other phones, tubes, parts, or pay cash. All donations acknowledged in my upcoming book. Thanks! Dick Mackiewicz, 1549 N. River Rd. Coventry, CT 06238, (203) 742-8552.

Western Electric paper-cone loudspeaker, in working cond. John Westman, 5107 Clover Court, Harrisburg, PA 17111, (717) 564-1865.

WANTED - INFORMATION

Am looking for personal info on John F. Rider. Will reimburse for any expenses incurred. Thank you. Joseph R. Forth, 321 Long Vue Acres, Wheeling, WV 26003, (304) 277-3154.

Circuit diagram, date, or any other info about a Morrow mobile modular ham transceiver from the '50s (?); Model 5B RF tuner, Model FTR amplifier/xmtr, and 6-volt power supply. Made by Morrow Radio Mfg. Co., Salem, OR. George B. Clemans, 851 West Wooster, St., Bowling Green, OH 43402, (419) 352-7198.

Instruction/operating manual for TV-2 tube tester. Also looking for Drake SW-4A rcvr and 100-kHz crystal calibrator for Drake 2-C. David Lowenstein, N7AF, 236 East La Jolla Drive, Tempe, AZ 85282.

Operating manual and schematic for a Model 3414 Triplett tube tester, copy OK. Kenneth Gfeller, Rt. 4, Box 172, Abilene, KS 67410, (913) 388-2433.

Photos, 35 mm camera, from Ft. Monmouth, NJ military radio museum; WW II, North Korean, Vietnam era. Alan Mark, PO Box 372, Pembroke, MA 02359.

WANTED - KEYS & TELEGRAPH

Telegraph gear such as early landline camelbacks, weight-driven registers, lineman's test sets, unusual bugs (speed keys) and spark era keys, preferably oil-break or those with huge contacts. Cond. not important. Gil Schlehman, K9WDY, 335 Indianapolis Ave., Downers Grove, IL 60515, (708) 968-2320.

Want Mac Keys, pre-WW II company literature (no ads please) and other T. R. McElroy items. Winter address: Tom French, W1IMQ, 1405 W. Bentrup St., Chandler, AZ 85224.

WANTED - LITERATURE

AWA Review Volumes 3, 4 and 5 in good cond. Will pay a reasonable amount. Thank you. Charles Swigart, 3717 Burton Ave., Toledo, OH 43612.

Old callbooks: amateur, broadcast, commercial and Govt. 1900-30. Bob Arrowsmith, W4JNN, PO 166, Annandale, VA 22003 or (703) 560-7161 (collect).

Operator's manual for Hallicrafters SX-110 or copies of same. Chuck Holmes, 340 E. Lancaster Dr., Stockton, CA 95207, (209) 477-9571.

Western Union Technical Review for 1955-52, 1956, 1958 & later. Anybody know when they stopped? Ludwell Sibley, 44 E. Main St., Flemington, NJ 08822, (908) 782-4894.

WANTED - MILITARY

Aluminum CS-48s, buy or trade steel ones. Rectifier RA-34, Generators GN-45, PE-49, PE-162-A. Robert Downs, WA5CAB, 2027 Mapleton, Houston, TX 77043, (713) 467-5614.

WW II Japanese, German military radio equipment and literature. Japanese tube MC-30, UZ-133D, UF-109A, UF-134, UZ-12C. Takashi Doi, 1-21-4

Minamidai, Seyaku, Yokohama, Japan.

Will swap Teledyne Model of Cutting and Washington Co. battery radio (see *OTB* March '82) for foreign WW II military rcvrs. Charles Newcomer, 100 Central Manor Rd., Mountainville, PA 17554.

WANTED - PARTS

1- and 2-gang variable capacitors, 365 pF or larger, for homebrew rcvrs. Broadcast-band adjustable RF coils. David Dameron, 819 Boundary Place, Manhattan Beach, CA 90266-6621.

16EP4A CRT; dial for Radiola 60; Zenith porthole G2350Z volume knob; Airline 62-101 chassis; Stromberg-Carlson 130J tuning knob; Fada 7 antenna mount and tuning knob bracket and knobs. Keith Park, 795 Grooms Rd., Rexford, NY 12148, (518) 373-0417.

AK 708 cabinet, RCA R-28 speaker and knobs; Clarion Jr. chassis. Steve Wallace, RD 5, Box 5081, Fleetwood, PA 19522.

Cabinets for Kennedy 110 and 525 or close-up pix and measurements, or set to visit in WA or OR. Driver for Rola Recreator horn speaker. Ralph Day, 30211 137th Ave., SE, Auburn, WA 98002.

Crosley VIII RF coil and filament rheostat; de Forest F-5 audios & bakelite chassis panel; grille for Radiola Grand. Don Sturzenbecher, Rt. 3, Box 28, Sioux Falls, SD 57106, (605) 368-2135.

Drum dial face or complete dial assembly and/or dial escutcheon for Philco 89; dial assembly for GE Model S22 or RCA R7, R9 Superette; tube shield for Silvertone 1808A; dial belt for AK 30. Daniel Carella, W2ENV, 39 Mechanic St., Millburn, NJ 07041, (201) 376-2810.

Horn only for a Western Electric 518-W driver. Magnavox driver for an 18" Magnavox horn. Any cond. considered. James Fisher, 344 Harrison Ave., Manville, NJ 08835, (908) 725-7476.

IF transformer for a Montgomery Ward (Airline) 62-194, Wards part #P-9A398, or someone who can rewind one. Bob Richmond, 3360 W. Water, Port Huron, MI 48060, (313) 984-2439.

Need AK detector unit - will pay $125. Also need AK coupled-circuit tuner - will pay $250. Thanks. Jim Peters, 983 Chapel Ct. South, Glen Ellyn, IL 60137, (708) 790-9699.

Parts, NOS X104 and X105 for Bendix LM-10 crystal-calibrated frequency indicator. Any info on radios built by Bill Wilson who lived at Amity St. in Brooklyn in the early 1920s. Fin Stewart, 1 Perduse Ave., San Remo, New South Wales, 2262, Australia.

Round plastic lens for Admiral Model 6512N; oblong plastic lens for RCA 6BX63; handle for Transoceanic Model 8G005YT. Robert Rossi, 10936 Melbourne, Allen Park, MI 48101.

Small spark gap. Mike Heffner, 724 Elmira St., Williamsport, PA 17701, (717) 323-3647.

Transformer for Sparton 931. 600 V, 5 V, 5 V, 2.5 V, all CT. Rewind or replacement. H. Seesselberg, 22 Christy Dr., Warren, NJ 07059.

Wirewound resistor, 2.5K to 3K ohm, 10 watts or more, with movable taps, to repair a B-eliminator that had been modified. Also details to assist restoration of an Omnigraph, particularly info on the cam action to raise and lower the contact-point frame to the next disk. Alton DuBois, Jr., 67 Peggy Ann Road, Queensbury, NY 12804.

WANTED - BC/SW TUBE RADIOS

Aeriola Jr. or early Aeriola Sr. (3 horizontal ribs) cabinet or junker sets. Early crystal or wireless sets & components. Dick Kowalski, KB8MR, 32823 Gloede Dr., Warren, MI 48093, (313) 294-6831.

Circa 1938 Detrola (Truetone) Model 155 AM/SW console. Top $ paid; McMurdo Silver 801, 801-B regen. rcvrs or coils (or winding info.) for same. Al Bernard, PO Box 690098, Orlando, FL 32819, (407) 351-5536.

Crosley radios, using four tubes (35, 24A, 47 and 80) Model 131 and Model 137. Prefer restorable sets but junkers OK for parts. James Di Ruzza, 2607 Old Troy Pike, Dayton, OH 45404.

Farnsworth radios. Herman Zeps, WD9JKQ, 319 S. Williams St., PO 282, Bluffton, IN 46714.

Marconiphone Type A2 Amplifier. British Crystal sets. I will pay top prices. Serious collector not looking for bargains. Ian Sanders, 16725 Wild Oak Way, Morgan Hill, CA 95037, (408) 778-7547.

Paragon DA-2 detector-amplifier; Marconi multiple tuner. John V. Smith, W4ACG, 1924 Dolphin Blvd., St. Petersburg, FL 33707.

Want in good shape, preferably working properly: Lafayette brown bakelite table set, AM-FM, AC-DC, 4 knobs, 1946-48; Motorola "Playmate-Juniors" 51M1u, 51M2u, 52M1u, 52M2u (green and maroon, with "flip-up" antenna-lid); Tele-Tone Model #165, ivory preferred; small 67-½ V battery eliminators, such as Maxell, Radio Shack, and Lafayette, etc.; Zenith Transoceanic Royal 3000, 7000; 2-track (not ¼-track) reel-to-reel tape recorder(s), such as Ampex 601-2, Sony 777/2 etc. Allan Sherry, 5410 Netherland Ave., Riverdale, NY 10471.

WANTED - TRANSISTOR/CRYSTAL SETS

Factory-made crystal sets, crystal radio kits, toy crystal sets and pocket crystal radios. Please make offer with your price and if possible include photo. Many thanks! Erwin Macho, Ambrosweg 17/A/8 A-1230 Vienna, Austria, (011431)-8814203.

Greg-Sor crystal radio, made by Sterling Mfg., Berkeley, CA about 1922. Tube radio made by

Sterling Mfg. in same era, may carry name Greg-Sor or Sterling. John Sorenson, co-owner of Sterling Mfg., passed away in Nov. '92. Heirs anxious for set(s) and/or info. Sterling A. Sorenson, AF6D, 430 S. McPherson, Fort Bragg, CA 95437, (707) 961-1680 (collect).

Sony TR-63, wkg. or not - your price paid and/or exchange for Italian sets. Also looking for anything related to Marconi. Please write/fax to Enrico Tedeschi, PO Box 10, 00125, Roma, Italy, phone/fax 52356085.

WANTED - TUBES & TRANSISTORS

Collectable tubes wanted, esp. spherical audion. Will buy collection. Also, odd-brand 01A tubes. Prefer in original box but any way OK. Ed Bell, 5311 Woodsdale Rd., Raleigh, NC 27606, fax/phone (919) 851-1517.

Daven 1-½" x 1-½" neon TV tube (Kinolamp). Don Joyce, 8088 Whalen La., Maineville, OH 45039, (513) 683-7013.

Sonora SO-1, RE-1, RA-1, DE-1 and/or Arcturus (blue glass) 40, 48. Must have good emission. Prefer new-in-box. John Swett, 29 Zeller Ct., Berea, OH 44017, (216) 234-4980.

Westinghouse WL-530 Pearl Harbor radar tube, Western Electric 219D, de Forest 430 through 440 tubes. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062, (913) 782-6455.

SALES ANNOUNCEMENTS

MORSE RESONATORS. Attention Morse operators: Repros of Bunnell "Acme" resonator, black pedestal, hoods (drilled for main-line or local sounder), your choice of dark red, gray, WU green or natural. Felt base, four-foot cord. $45 includes UPS. No CODs. Jack Proefrock, K6QEQ, 20814 S. Hawaiian Ave., Lakewood, CA 90715.

BC-348 INFORMATION. First user-friendly circuit on early BC-348s, with most component values on 2 sheets. Send $2 with (3) 29¢ stamps. Ray Larson, 12241-½ Gorham Ave., West Los Angeles, CA 90049.

KNOBS. custom-molded plastic. Send knob to be duplicated plus $8 ea. for plastic, $12 ea. for imitation wood or Catalin. Custom-formed plastic dial lenses. Send old lens, if possible, tracing of lens opening, bezel if radio has one, plus $15 each. L. Wade Terrell, 7109 E. Arbor Ave., Mesa, AZ 85208, (602) 830-7849.

REPAIR INFORMATION. Schematics - 1920-70 radio, ham, TV, electronic organ, test gear, Canadian, misc. $5 PPD. For quotes on manuals, send SASE. "If I don't have it, you probably don't need it." Tektronix RM-503 scope manual and other Tek manuals. Alton Bowman, 4172 East Ave., Canandaigua, NY 14424-9564.

STOCK CERTIFICATES. Baird TV Ltd. (1933), $75; Marconi Wireless (1912), $60; Columbia Graphophone (1922), $150; Emerson Phonograph Co. (1915), $50; Collins Radio, $20; Admiral, Sentinel, AT&T, Western Union, IRC, Tung-Sol, Jefferson-Travis, Philips NV, $10 each. Joe Papovich, 53 Magnolia Ave., Pitman, NJ 08071.

"FEDERAL" BOOK. Booklet of 64 pages describes Federal Tel. & Tel.'s radio operations from the beginning in 1921 to its demise in 1929. 60+ illustrations, including pix of early Federal RF and audio amplifiers, all early radios, and many Federal parts. The article and presentation by Dick Schamberger, Federal expert, are included. All Federal models are listed with the year and month introduced, brief description, and price new. Buffalo's first AM station, Federal's WGR, is described. There are two pages of references for more Federal info. More about Federal than exists in any other spot! Good-quality printing. Send $4.95 + $1.00 for shipping & handling to Larry Babcock, 8095 Centre Lane, East Amherst, NY 14051.

"THE SIGNAL CORPS". WW II military collectibles and gear for re-equipping vintage vehicles and aircraft. See review of catalog in this *OTB*. Fifty-page catalog $2 U. S., $5 foreign (counts toward purchase), from "The Signal Corps," Sam Heavener, 3583 Everett Rd., Richfield, OH 44286.

LOUDSPEAKER RECONING. For cast and stamped-frame speakers, 4" to 18" and oval. Foam-surround replacement kits, dist caps, gaskets. Shipment via UPS. Also, Zenith Radio Locator Index, 1920-68, "Where to Locate Information and Photo," $14.95 ppd. Send SASE for price list and order form. Sound Remedy, 331 Virginia Ave., Collingswood, NJ 08108, (609) 869-0238.

LAFAYETTE MANUALS. "The largest selection of Lafayette Radio manuals in the country," from their early products to the last ones they sold; also manuals for non-Lafayette products (National, Clegg, Heathkit, Johnson, etc.) which were sold through Lafayette stores; likewise user, operating, and service manuals, addendum sheets, spec sheets, and service notes. For a price quote on a specific manual, contact Pete Markavage, 27 Walling St., Sayreville, NJ 08872, (908) 238-8964; SASEs requested on mail inquiries.

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the Collector, Historian and Old Time Wireless Operator

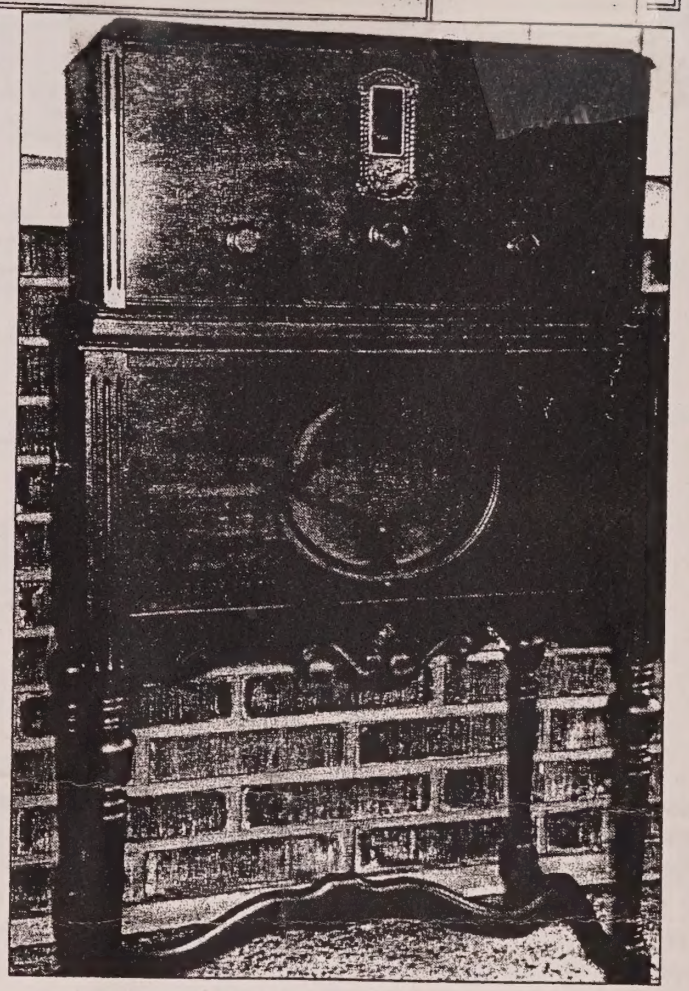
VOL. 35 FEBRUARY 1994 NO. 1

ended up with ... part is identical to

REVIVING A MAJESTIC MODEL 71

Harry Stavert
7231 68th Ave. NE, Marysville, WA 98270-7742

An old friend of mine who had been in the radio-TV service business for the last 60 years recently passed away. In a dusty corner of his service shop, sitting silently for past decades, was a Majestic Model 71 console. He had promised his daughter that some day he would make it work for her. Unfortunately, he didn't quite "get to it" and, with his passing, she asked me if I could make it go.

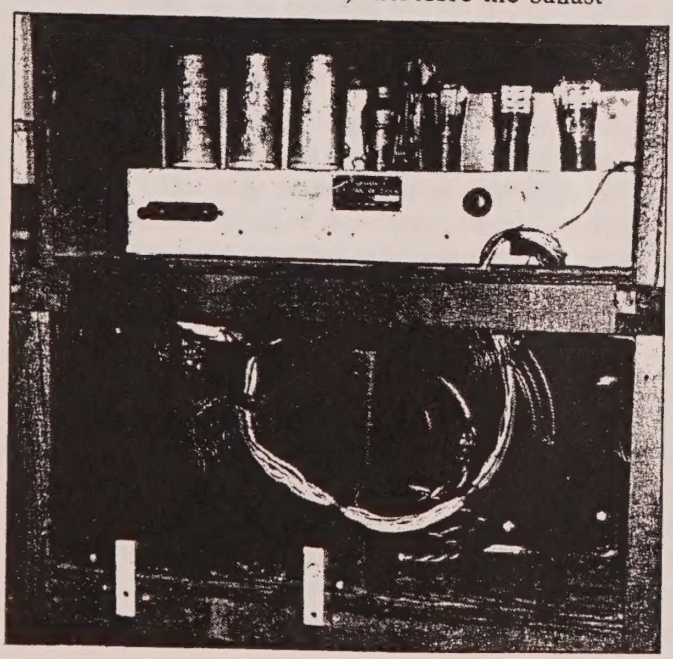


My first look at the radio didn't result in an eager desire to work on it. Besides everything being covered with dust, the field-coil-type speaker was missing, half the tubes including the ballast had disappeared, and the dial cable was broken.

After pulling the chassis, I discovered that the external power supply was a disaster! The power transformer was burned out and the filters shorted (explaining the blown transformer). The encouraging item was that Majestic had used a separate filament transformer which was still OK. Imagine trying to find a replacement with four windings - two 1.5-volt, one 2.5, and one 5!

It was obvious that the power supply could not be returned to the original configuration. A decision was made to do what was necessary to make the radio play. Improvising a plate transformer to replace the one burned out was fairly easy.

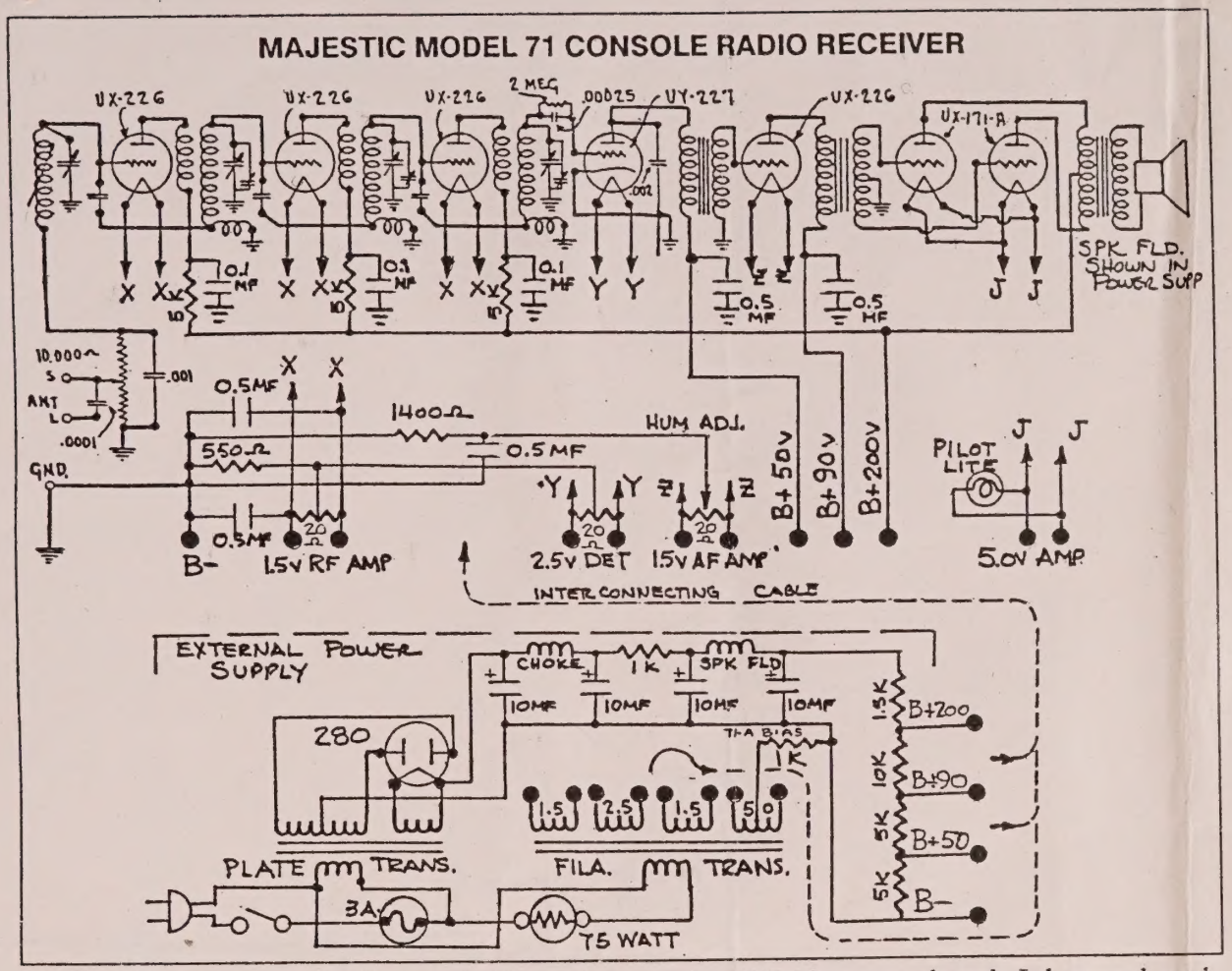
The filament transformer was originally connected through the ballast resistor. Present-day AC-line fluctuations are insignificant compared to those found in the Twenties, therefore the ballast isn't really required. However, it was necessary to duplicate the 30-volt drop across the ballast. It was found that a 75-watt light bulb provided this drop nicely when used in place of the ballast.



The next unpleasant surprises were in the radio chassis. Rubber-covered hook-up wire had its insulation rotting off, and had to be replaced in several locations. All the 0.5-μF bypass capacitors had excessive electrical leakage and had to be changed. The pre-amp audio transformer was open.

Rider's Volume 1 shows the Model 71 under "Grigsby-Grunow" as the model 70B, with the 7P6 external power supply. As is often the case, the set wiring doesn't quite follow the diagram. One example is 90 volts B+ shown in Rider's for the RF stages. The set was wired to supply them with 200 volts. The diagram also shows the same 90-volt wire strangely continuing to the field-coil terminals on the radio chassis. Fortunately that was not the case in the set wiring.

The diagram shown herein is what I finally ended up with. The upper part is identical to



Rider's. The power-supply filters and voltage dividers are different because the new transformer had a higher secondary voltage and required a little juggling of resistor values. Also, decoupling resistors and capacitors have been added to each RF-stage plate supply. This was done for two reasons: to help eliminate squeals resulting from possible impedance coupling via the power supply, and to reduce the plate voltage to 180 maximum.

The final reward was in the performance of the radio. In my opinion, this set is probably the best-running TRF I have ever heard. It has good sensitivity across the dial, not unlike a well designed superhet. There was no sign of any feedback or squeal. One remarkable discovery was that the neutralization in the RF stages is still in adjustment. I have no reason to believe that anyone has touched it since it left the factory in 1929. It has held perfect alignment for this whole period!

Webster defines the work "majestic" as inspiring awe and reverence. I think that describes this radio. It is truly majestic!

(Continued from p. 30)

While I don't begrudge the sellers, I was sorry to see people waste money on low-end pieces.

The only realistic way to determine the correct pricing for all of these sets, both low- and high-end, is to read classified radio ads and then phone some of the sellers. You might even call known collectors to find what they'll sell and at what price. If you take this approach, I predict an elucidating experience. Also ensure that the radios you buy are virtually flawless. At the high end some problems are acceptable but they depreciate the value of the set enormously. That's why the cracked TR-1s were no bargains. A "fine" example out of the box will still appear, albeit rarely, in the $200-300 price range. Even if it costs more, it's worth it because you can always sell it for at least what you paid. The Rochester TR-1s will take extensive and costly restoration before they can be sold at market price, leaving the buyers with an investment of close to $500, a price that is realistic for a fine black TR-1 out of the box, sans papers.

The bottom line is that Rochester has a long way to go before it becomes a mecca for transistor collectors, although improving slowly. We'll know we've made it when a TR-1 or TR-63 wins "best in show" or, more important, adorns the cover of this fine worldwide publication.*

If you have comments or questions, you can reach me at (201) 585-0030, fax (201) 585-1659, or write to the address above.

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* Make it happen! Send in color photos of suitable quality, or, better yet, color transparencies. - Ed.

BOOK AND MAGAZINE REVIEWS

EDITED BY
Bruce Kelley
59 Main St., Bloomfield, NY 14469

HACKER RADIO

By Geoffrey Dixon-Nuttall and Gordon Bussey. 29 pp, 6" x 8" format, 24 photos, ISBN 0 9522197 0 0, 1993, £5 postpaid in the U. S., from G. D. N. Publications, Longmeadow, Miles Land, Cobham, Surrey KT11 2EA, England.

This charming booklet by the outgoing Chairman of the BVWS, and the co-author of The Setmakers respectively, details the history of the Hacker companies, which produced top-of-the-line Dynatron and Hacker receivers, radio-phonographs and early (405-line) big-screen TV sets for the British market beginning in 1927. During WW II they made preproduction models of avionics for the RAF (Gee, Oboe, and Rebecca sets) and even a transistor radio in "modern" times. The company lasted until 1978.

This history will be of particular interest to North American readers familiar with E. H. Scott sets, with which Hacker competed in the British market. Scott is known for, besides opulent cabinetry, significant technical features: audio equalizers to offset loss of high frequencies in the IF stages, rotary coil turrets, volume expanders, brawny power amplifiers, etc. But Hacker sets offered innovations of their own, some of them upstaging Scott: sets with interchangeable power units to match the local power-line voltage and frequency, high-quality TRF design long after the superhet had become common, bandpass tuning, AVC at an early date, variable selectivity, noise suppressors, tunable/calibrated whistle filters (a necessity under European receiving conditions), dual conversion and grounded-grid RF stages for SW reception, etc. Some of their models, on being set to the widest bandwidth, switched to TRF operation. Some of their tuning dials had a neon lamp built into the tuning pointer which lighted when a station was tuned in. Some used a magic-eye tube to warn of impending clipping in the output stage - a feature not common until the transistor-stereo era. Some of the radio-phonos included the Capehart both-sides 78-RPM record changer mechanism.

Collectors familiar with the naming of Hallicrafters sets (Sky Rider, Sky Champion, etc.) will be intrigued with the naming of Hacker models: Ether King, Ether Lord, Ether Prince, Ether Knight, Ether Emperor, Ether Empress, Ether Duke, Ether Marquis, etc.

The book, besides giving the biographies of the founders and tracing the corporate reorganizations that took place, gives a table of now-rare models year-by-year, with original prices and commentary.

This booklet is well written and informative, even for someone with no prospect of acquiring one of the sets! - LAS

THE GIBSON GIRL STORY

By James A. Fred. 11 pp., 5½" x 8½" format, xerocopied, $3, from Antique Radio Press, R1, Box 41, Cutler, IN 46920.

The "Gibson Girl" air-sea rescue transmitter is a familiar military collectible today, but a real saver of lives in its time. (See *OTB*, Vol. 31 No. 4, Feb. 1991, for Louis Meulstee's full story on the German-British origins of this set.) In this booklet, radio old-timer James Fred details his experiences as a Signal Corps inspector on the Kingston Products production line in Kokomo, making the early (BC-778/SCR-578) version of this hand-cranked set. It includes several original photos of work in the factory, as well as pictures of the transmitter in use in an inflatable raft.

Of course, there's no harm in including an extra $2 and ordering the Antique Radio Labs catalog (see last May's issue for its contents).

THE XTAL SET SOCIETY NEWSLETTER

Membership: $9.95, to The Xtal Set Society, c/o Phil Anderson, 789 N 1500 Rd., Lawrence, KS 66049-9194 (in Canada: $11; elsewhere, $16).

This is a seven-page, 8 x 11" x 11" laser-typeset newsletter, now apparently in its third year. It contains basic crystal-receiver theory, news tidbits, circuits, literature references, and general discussion of broadcast and short-wave crystal receivers. Simple passive radios naturally have severe limits on performance (you can get only so many picowatts out of the antenna, you can have high sensitivity or good selectivity, but never both). Still, there's appealing magic in getting signals out of the air with primitive technology . . . and, with all the megawatts of SW broadcasting today, SW DX has never been more feasible. So crystal enthusiasts are still with us!

Back issues are also available. - LAS

CLASSIC HAM RADIO SHOPPER'S GUIDE

Monthly, 8½" x 11" format, 6 pp to start, $12/yr by first-class mail, from David A. Knepper, Box 34, Sidman, PA 15955, (814) 487-7468; sample copy for an SASE.

This new specialized list, the "Gray Sheets," is pointed toward collectors and restorers who want to network with related hobbyists to exchange, buy, or

sell their equipment and parts. Articles are planned on restoring 1940-70 classic gear made in the U. S. Subscribers may advertise free each month. Inspection of a sample shows a rich variety of "classic" sets and parts by Collins, Drake, Gonset, Hallicrafters, Hammarlund, Heathkit, National, WRL, etc.

CATALOG - COLLECTOR'S TUBES

Antique Electronic Supply puts out a special list, updated periodically, of specialty tubes of interest to collectors and available only in limited quantities. The current list has 150 entries with "new," "good," "weak," or "dud" items. Types and brands include Arcturus blue, Western Electric "tennis-ball" and regular, Philips, Marathon, Cardon, de Forest, Sodion, Daven, etc. There are brass-based and tipped variants of '20s types and some British military types. The list is available from Antique Electronic Supply, 6221 South Maple Ave., Tempe, AZ 85283, (602) 820-5411, fax (602) 820-4643.

CATALOG - ELECTRON TUBE ENTERPRISES

This 12-page catalog lists about 2000 types of new-old-stock tubes from U. S. and European makers. The list includes 01As (ST bulb), two-digit receiving types, "all" the other receiving tubes, audio types, transmitting and industrial versions, etc. Prices seem to be reasonable. The firm is operated by AWA member Dick Bergeron, who also puts out a "want" list of types to be bought. The address: Electron Tube Enterprises, Box 8311, Essex, VT 05451, (802) 879-0611, fax (802) 879-7764.

ELECTRONIC PARTS CATALOG - A. G. TANNENBAUM

This 13-page catalog lists new-old-stock parts (capacitors of all types, fuses, chips, bulbs, transistors, switches, etc.). A major feature is pre-owned Sams Photofacts and other service literature. New in this edition is a page of oldie books related to electronics repair, and a small selection of vintage TV sets, transistor radios, comm gear, broadcast sets, and test gear. The address: A. G. Tannenbaum, PO Box 110, East Rockaway, NY 11518, (516) 887-0057, fax (516) 599-6523.

CATALOG - "THE SIGNAL CORPS"

5½" x 8½" format, from "The Signal Corps," 3583 Everett Rd., Richfield, OH 44286-9723. $2 price ($5 foreign) applies toward purchase.

Military-radio dealer Sam Heavener has produced his sixth, enlarged catalog, entertainingly designed to look like a WW II tech manual, and offering 50 pages of 1940-50 (or so) radios. He proclaims himself a WW II specialist, and proves it with contemporary equipment: BC-348s, 620s, 659s, 733s, 1335s; SCR-274Ns (including a complete system), 518s, 522s, 625s; ARC-1s, 2s, 3s, and 5s; ARR-1s and 2s; APN-1s; APQ-9s; APS-13s; GF/RU sets; IFF gear; various aircraft instruments; a No. 19 Mk II; and so on. The book is informatively written and illustrated. The gear is for the serious collector, priced commensurate with 50-year-old equipment, much of it still-in-the-crate and complete with dynamotors, etc. The material is largely gear that Fair Radio no longer offers, so this is a "second chance" to get unmodified military collectibles.

WHOLESALE AUDIO VALVE CATALOG

Billington Export Ltd., Unit 1E, Gillmans Industrial Estate, Billingshurst, West Sussex RH14 9EZ, England, (0403) 784961, fax (0403) 783519.

This catalog, although calling its contents "audio" tubes, offers the whole line: receiving, transmitting up to 35-kW, radar specials, British military "Common Valve" types, etc . . . but focused on the user as opposed to the collector. The range of types totals about 1300, from a veritable United Nations of makers world-wide. As for the audio types, 6CA7s/EL34s are in a choice of AEG (ex-East German), house-brand East German, Mullard, Tesla (Czech), GE, house-brand Chinese, Russian, and Yugoslavian. The buyer of KT88s is offered house-brand Chinese at £13.97 and Yugoslavian (price on request), or is encouraged to substitute Russian 6550WAs at £15.89, STC S11E12s/CV4060s at £38.57, or STC CV345s/12E1s at £13.30. For 300Bs, "Silvertone" Chinese units are available at £53.13, or the user can substitute a Russian 6C33CB at £27.93 with a change of socket. There are transmitting tubes, too, like Russian 572Bs at £33.25 and 813s at £26.60. There are even (uggh!) semiconductors.

The catalog has considerable educational value besides its usual purpose. The Russian/Soviet brands (Sovtek, Teonex, and Thermionic) offer 2K25s and 12SQ7GTs. (Ever wonder what happens when your "All-American Five" receiver includes a *Russian* 12SQ7?) The tubes offered may be quite handy in restoring European receivers and audio gear. - LAS

LEE DE FOREST AND THE FATHERHOOD OF RADIO

By James A Hijiya. Hardbound, 6" x 9½" format, 182 pp., 22 illus., ISBN 0-934223-23-8, $32.50, from Lehigh University Press, 440 Forsgate Drive, Cranbury, NJ 08512.

This new biography of Dr. de Forest provides a carefully researched, readable exposition of his approach to the "religion of technology." It reveals de Forest's drive, throughout his adult life, to attain a sort of immortality via inventions and the homage of his fellow humans rather than through conventional religion.

The book uses many of the same source materials as Empire of the Air, but focuses on de Forest alone. It is highly readable, and fills in many details of, for example, his abortive research/business efforts in sound-movie development. The author wisely leaves technical controversies to other writers like Hugh Aitken. He is also very gentle about

AWA REVIEW, VOL. 8

Volume 8 of the AWA Review is now available. See next page for a convenient order form.

In "**Unusual Military Morse Keys**," Louis Meulstee presents a group of British and European wireless and radio keys, with photos of the equipment that used them. This includes some intriguing "agents' sets" and military radios from the West and the Eastern Bloc.

Years ago, tube expert Gerry Tyne gave a talk to an AWA conference audience on some particularly early and scarce tubes. His "**Rare Tubes: How to Recognize Them, and Why They Are Rare**" has been brought from the archives with the aid of photos by collector Jerry Vanicek.

Today's radio historian knows of Reginald Fessenden vaguely, as a prolific wireless inventor. However, we are generally unaware of the variety and volume of his publications. "**A New Bibliography of Reginald A. Fessenden**," assembled by David Kraeuter, shows how extensive those writings were.

The Federal Telephone and Telegraph Company of Buffalo made numerous collectible radios, from the Junior crystal receiver and Model 61 tube set to the "Ortho-sonic" consoles of 1929. But about two-thirds of Federal's lifespan was in the telecommunications industry, struggling with the local Bell company for survival. "**'Federal' as a Telephone Company**" by Ludwell Sibley shows the forgotten side of this firm.

The *other* Federal was the California group that built arc transmitters and provided domestic and transpacific radiogram service. Its direct descendant is in business today. "**The KFS-Federal-Mackay Story: From CW Arc to Silicon Valley**" by Hank Olson, W6GXN, and Bill Orr, W6SAI, traces the origins of today's coastal station KFS from Federal.

One of the greater surviving collections of early vacuum tubes is the one assembled by a figure little known today. In "**Joseph T. Fetsch: Vacuum-Tube Engineer and Collector**," Jerry Vanicek covers the career of this individual and gives photo coverage of his collection.

Many of the prime radios of WW I vintage came from "NESCO." In 1961, AWA printed Ted Duvall's "**A History of the National Electrical Supply Co.**" NESCO can be traced back to 1885 or so, and forward to present-day electronics firms like Potomac Instruments. We've updated this history and expanded it.

In Review 6, Fred Chesson published his handy directory to Signal Corps radios of the 1915-43 BC-SCR-RC era. Now, in "**Navy Electronics Directory**," we have a comparable guide to Navy electronic equipment of the same vintage, that is, up to introduction of the "AN" nomenclature system.

Many AWA members have had experience "debugging" newly built transmitters for efficiency and stability, but we have no idea how hard this work was in the early days. "**A Glimpse at Old-Time Transmitter Development**" is a 1930 report by GE engineer Walter Nelson on his difficulties - and success - in taming a *big* (200-kW) experimental broadcast transmitter.

The book, with 154 pages and 163 illustrations, is priced at $12.50 postpaid (U. S. and Canada; $14 ppd elsewhere). It may be ordered with the form printed in this *OTB*, or by sending a check payable to "Antique Wireless Association" to AWA, 44 E. Main St., Flemington, NJ 08822-1224.

OTHER REVIEWS STILL AVAILABLE

VOL. 6

▪ **The Eaton Tube Collection** (George Clark, Bruce Kelley, Lauren Peckham, et al.); ▪ **The General Electric Company Considers Buying the De Forest Radio Telephone and Telegraph Co., 1916** (John Anderson); ▪ **The First Years of Wireless in the Hawaiian Islands** (Robert and Tina Wiepert); ▪ **A Review of Early Television in the U. K.** (Pat Leggatt); ▪ **Signal Corps SCR-BC-RC Directory** (Frederick Chesson); ▪ **Who Invented the Superheterodyne?** (Robert Champeix, translated by Richard Foster); ▪ **Amateur Radio in the New York City Area Pre-WW I** (Daniel McCoy); ▪ **Radio Tube Manufacture in Australia** (Fin Stewart); ▪ **The Military Communications Explosion, 1914-18** (Louise Moreau); ▪ **The U. S. Patents of Alexanderson, Carson, Colpitts, Davis, Gernsback, Hogan, Loomis, Pupin, Rider, Stone, and Stubblefield** (David Kraeuter)

VOL. 7

▪ **Ricevitore Popolare Italiano** (The Italian People's Receiver) (Robert Lozier); ▪ **Memories of Early Electron-Tube Development** (Edward Herold); ▪ **The First High-Power Transmitter at Poldhu** (Desmond Thackeray); ▪ **Secret Tubes for Radar - the Western Electric 700-Series** (Ludwell Sibley); ▪ **Military Electronic Equipment - Naval Equipment Manufacturers** (Frederick Chesson); ▪ **A Brief History of the Valve Audio Amplifier** (Carlos Fazano); ▪ **The Eaton Tube Collection Revisited** (Jerry Vanicek); ▪ **The Arc Method of Producing Continuous Waves** (William Byron); ▪ **The Goddard Oscillator** (M. D. Hall); ▪ **The Evolution of Broadcasting from the Transmitter Viewpoint** (author unknown, located by John Anderson); ▪ **Index and Additions to Patents Lists** (David Kraeuter)

These earlier volumes are orderable the same as Vol. 8.

BACK ISSUES

The following issues of the *OTB* are orderable via AWA, 44 E. Main St., Flemington, NJ 08822-1224. Prices are $2.50 each postpaid, with 20% discount for 6 or more issues and 30% off for 12 or more. Index to *OTB* Vols. 20-34 and Review Vols. 1-8, free on request with purchase.

Volume and Number:				20-1	20-3	21-2	22-2	22-3	22-4	23-1	23-3	23-4	24-1
24-4	25-3	25-4	26-1	26-2	26-3	26-4	27-1	27-2	28-1	28-2	28-3	28-4	29-1
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33-2	33-3	33-4	34-1	34-2	34-3	34-4	35-1						

Special-theme issues contain the normal columns and news, plus a core of features on a particular topic area. The number of special-focus pages in each issue is listed below.

40th Anniversary Special ("Best of *OTB*, 1960-82") (33-2, June 1992) - all 48 pp.
Broadcast Receivers (30-4, Feb. 1990) - 12 pp. of 48.
Communication Gear (32-1, May 1991) - 18 pp. of 48.
International topics/equipment I (31-4, Feb. 1991) - 11 pp. of 48; **II** (34-3, Aug. 1993) - 20 pp. of 64.
Military equipment (30-3, Nov. 1989) - 17 pp. of 48.
Restoration I (31-2, Aug. 1990) - 20 pp. of 56; **Restoration II** (34-2, May 1993) - 17 pp. of 68.
Tubes (31-3, Oct. 1990) - 19 pp. of 48.
Wireless equipment and stations (31-1, May 1990) - 15 pp. of 48.

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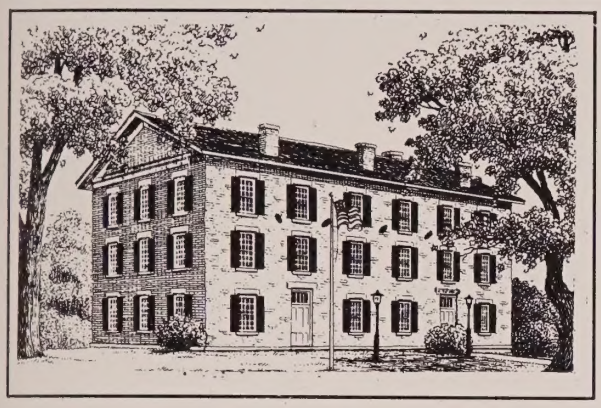


AWA ELECTRONIC COMMUNICATION MUSEUM

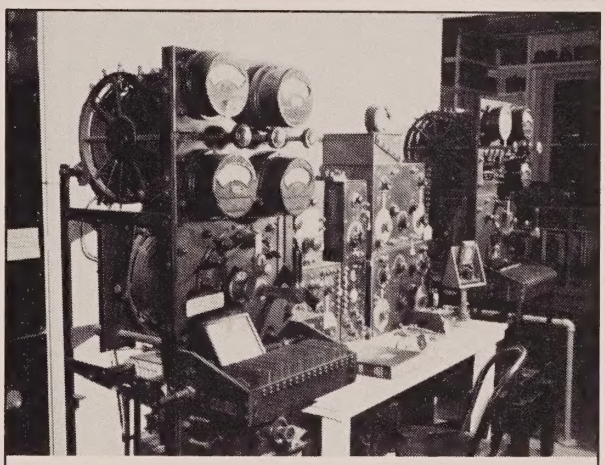
Location: Village Green, NY 5 & US 20, Bloomfield, New York
Hours: May 1 through October 31: Sunday, 2-5 PM; also, June 1 - August 31: Saturday, 2-4 PM and Wednesday, 7-9 PM. (Closed Holidays)
Group tours: by appointment
Museum telephone: 716-657-6260
Amateur Station: W2AN
Mailing Address: Bruce Kelley, Curator, 59 Main St., Bloomfield, NY 14469
FREE ADMISSION

NEW GEAR - AWA MUSEUM

The following list includes donors of cash and artifacts explicitly for auctioning at Rochester to support the Museum.

Ray Anderson, W5VCN; Bob Barnett, WA2-EWA (SK); Clem Becker, KH2HYP; Frank Becquaert; Bill Booker, W4WZU; Howard Bradley, W2QHH (SK); Tom Broome; Michael Callahan - Museum Technology; Dex Deeley; By Goodman, W1DX; Larry Johnson; Fred Linn, W9NZK; Charles Lustik, K3HSS; Ross Smith; Nick Smith, W3FNU; Fran Thisse, W2BJI; Norm Wilford, W1TLZ; Dr. Charles Wilson, W5ZKM (SK).

The Museum was the recipient of three outstanding donations: several new amateur receivers and transmitters (Nick Smith, W3FNU), a rare framed 1915 ARRL membership certificate, and the remarkable collection of awards and certificates achieved by top DXer Howard Bradley, W2QHH.



Shipboard gear in the Museum: three IP-series receivers flanked by quenched-gap spark transmitters.

the numerous aspects of de Forest's life that are fertile ground for muckraking.

For the casual reader, Empire is a more cost-effective book, but this one gives useful concentration on de Forest alone. - LAS

THE VAIL CORRESPONDENT

Quarterly, 5½" x 8½" format, typically 20 pages, $10/yr (U. S; $12 to Canada or Mexico; $16 elsewhere), from The Vail Correspondent, Box 88, Maynard, MA 01754.

This newish (1½ years) publication is published by Tom French, author of two recent books on keys. It is aimed toward the growing group of key collectors, with an emphasis on 20th Century models, especially "bugs." A recent issue included a feature on the Speed-X line of keys and the Les Logan Company, with lots of photo coverage of specific keys and a detailed table of models. There is a directory of specialist key collectors, a "mystery" bug, a column of hints for collectors, and the continuation of a series on Signal Corps keys. There are, sure enough, want ads, starkly but honestly labeled "unclassified." This looks like a worthwhile ongoing supplement to the variety of books that have appeared in this area: well written, lively, and carefully laid out.

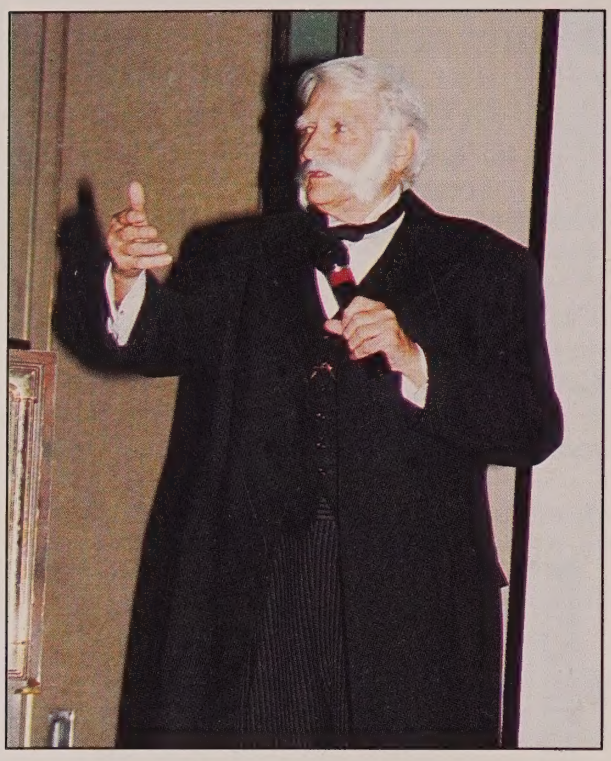
EMPIRE OF THE AIR

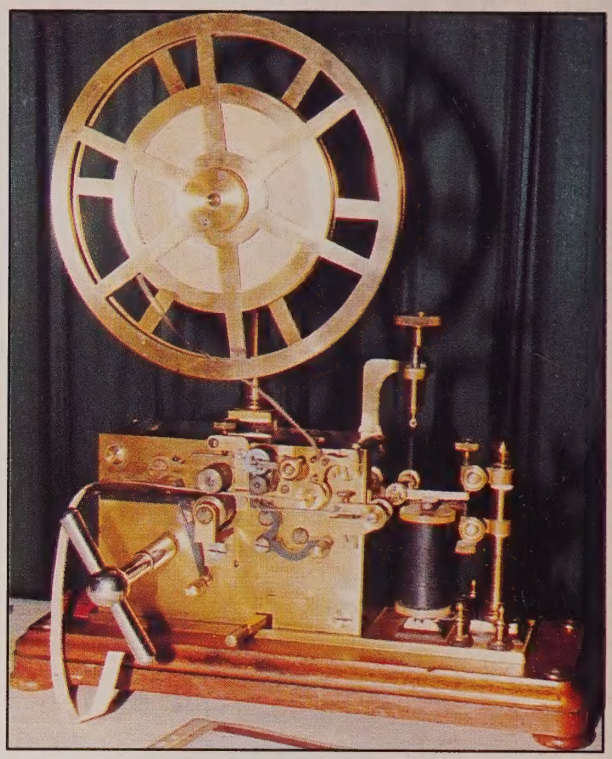
The Association has a few *hardbound* copies of Tom Lewis' "must-read" Empire of the Air, available at a discount price: $20 plus $1 shipping. Orders may be directed to Dexter Deeley at 8 Briar Circle, Rochester, NY 14618.

SERVICE SOURCES AVAILABLE

The "AWA Source Sheet," an up-to-date and growing listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope, to AWA, Box E, Breesport, NY 14816.

JUST PIX





Left: Charlie Ruch delivers a polished performance as George Westinghouse, narrating a slide show at Rochester on the life of the early electrical inventor-manufacturer. Right: a fine L. M. Ericsson telegraph register, with brass and beveled glass gleaming, in the auction. *Photos: R. Ransley*

This seven-tube "Imperial" cathedral owned by John O'Briant was a mystery as to maker. It has the trade name and a 1933 date, but no further identification. The possibilities indexed in Rider's binders under this name were no help - it's not a Triangle Electric Co. "Imperial" car radio, nor is it an AC-DC, a set with fewer tubes, or an "Imperial" of a later date. The solution was in the private-brand manufacturer codes in the Radio Trouble-shooter's Handbook by Alfred Ghirardi, pp. 709-719 in the 1939 edition. A "BRC" on the patent-license label led to Belmont Radio Corp., and then to Belmont Series 70A, Model 71A, in Rider's. The other codes: "E," Sentinel Radio Corp, Evanston, IL; "OA," Belmont again, and apparently also Ozarka Radio Corp.; "Plant A," Clinton Mfg. Co.; "RPC," Continental Radio & Television Corp., and apparently also Radio Products Sales Co.; "T. R. & T.," Radolek Co.; "WG24," Wells-Gardner; "25" before the serial no., Pacific Radio Corp., Los Angeles. Plants were in Chicago unless noted. Ted Hannah cited the usefulness of this book in the *MAARC Newsletter* several years ago. *Photo: J. O'Briant*